

**RESTORATION ADVISORY BOARD MEETING
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), BETHPAGE
TOWN OF OYSTER BAY, BETHPAGE COMMUNITY CENTER
103 GRUMMAN ROAD WEST, BETHPAGE, NEW YORK
WEDNESDAY, APRIL 17, 2019**

The forty-third (43rd) meeting of the Restoration Advisory Board (RAB) was held at the Bethpage Community Center in Bethpage, New York. Meeting attendees included representatives from the Navy (Brian Murray and JC Kreidel), The Management Edge (Joe Foran), New York State Department of Environmental Conservation (NYSDEC) (Don Hesler and Jason Pelton), New York State Department of Health (NYSDOH) (Steve Karpinski), Nassau County Department of Health (NCDOH) (John Lovejoy), Bethpage Water District (BWD) (Teri Black, Michael Boufis, Sal Greco, and John Sullivan), Massapequa Water District (MWD) (Stan Carey), New York American water (NYAW) (Greg Sachs), South Farmingdale Water District (SFWD) (Ralph Atoria), KOMAN Government Solutions, LLC (Greg Pearman), Tetra Tech (David Brayack, Jeff Orient, Melissa Cushing, and Kristi Francisco), APTIM (Monica Smeal and Bill Deane), Nassau County Legislature (Rose Walker), New York State Assembly (Michael Jannis), Town of Oyster Bay (Rich Lenz), and Resolution Consultants (Michael Zobel). RAB members in attendance were Sandra D'Arcangelo, Robert Horan, Edward Olmstead, Bill Pavone, David Sobolow, and Rose Walker. There were approximately 43 residents from Bethpage and neighboring towns in attendance. A local newspaper and television news were also in attendance. The meeting sign-in sheet is provided as Appendix A. The Agenda and Definitions are provided in Appendix B.

OPEN HOUSE SESSION

Prior to the start of the meeting, an open house session was held. The public was invited to peruse the information provided and ask questions to the Navy representatives, contractors, and regulators. A copy of the posters displayed during the open house is presented in Appendix C.

WELCOME AND AGENDA REVIEW

The Navy representative, Mr. Murray welcomed everyone to the RAB meeting and presented the agenda. In addition, Mr. Murray reviewed the background on the Naval Weapons Reserve Industrial Reserve Plant (NWIRP) Bethpage facility, and gave a brief update on the status of the operable units (OUs), the treatment systems, and wellhead treatment at the water districts. Mr. Murray then introduced Mr. Foran (The Management Edge, serving the role of facilitator in support of the RAB) who then went over the Rules of Conduct to ensure that everyone is allowed the opportunity to comment. Mr. Foran introduced Mr. Sobolow, the RAB co-chair, Mr. Murray (Navy

representative), Mr. Deane (APTIM), Mr. Brayack (Tetra Tech), and Mr. Orient (Tetra Tech).

OPERABLE UNIT (OU) 4 – SITE 1 FORMER DRUM MARSHALLING AREA REMEDIAL CONSTRUCTION UPDATE

Mr. Deane, APTIM, provided an update of the NWIRP Bethpage Site 1- Former Drum Marshalling Area history and the remedial action planning for the soil, soil vapor and groundwater remedy. The Remedy consists of soil excavation and offsite disposal and capping, groundwater monitoring, and enhanced soil vapor extraction to be implemented in 2019. Mr. Deane reviewed the schedule for excavation and disposal and how the traffic, dust and noise would minimally impact the residents. The presentation is included in Appendix D.

OPERABLE UNIT (OU) 2 - OFFSITE GROUNDWATER INVESTIGATION

OU2 Offsite Groundwater Investigation:

Mr. Orient, Tetra Tech, presented the offsite groundwater program objectives. Mr. Orient reviewed Navy's objectives for the groundwater investigation and on-property testing to support Preliminary Assessment/Site Inspections for per- and polyfluoroalkyl substances (PFAS), 1,4-dioxane and radium. Mr. Orient then presented the vertical profile borings (VPBs) and groundwater wells that have been installed and sampled since 2009. He described work performed since the last RAB meeting and future work to be implemented. The presentation is included in Appendix D.

VPB and Well Installations:

Work performed since April 2018 includes: On-property, installation of three monitoring wells (on the former Bethpage property north of VPB201) and installation of one vertical profile boring (VPB201), currently installing monitoring well MW201D, conducted four rounds of quarterly groundwater sampling, and four rounds of water level measurements. Off-property, installation of 13 monitoring wells associated with VPBs 132, 134 and 135 and installation of one vertical profile boring (VPB174), currently drilling VPB172 and conducted four rounds of quarterly groundwater sampling, and four rounds of water level measurements. Anticipated work through November 2019 includes: installation of four additional VPBs (two on-property and two off-property south of Hempstead Turnpike) eleven monitoring wells (two on-property and nine off-property), two recovery wells (off-property, one north of Hempstead Turnpike and one south of Hempstead Turnpike) and continued quarterly groundwater sampling.

RE108 AREA HOTSPOT TREATMENT SYSTEM UPDATE

Mr. Brayack, Tetra Tech, provided an update on the RE108 Area Hotspot investigation and remediation. The presentation is included in Appendix D.

Phase I RE108 Area Hotspot Treatment System Update:

Mr. Brayack reviewed the Phase I status and also provided a timeline for system design. This included the Phase I 30 percent design completed in October 2017. The Phase I system, which addresses the northern portion of the VOC-impacted groundwater, will include an extraction well and double wall piping from the RE108 hotspot to the Navy's existing GM38 Area Hotspot Treatment System. The existing Nassau County (NC) 495 Recharge Basin currently being used for GM38 discharge will also be utilized for the Phase I RE108 Hotspot discharge. Pending access, the Phase I System is expected to start operation in 2019.

Phase II RE108 Area Hotspot Treatment System Update:

Mr. Brayack reviewed the Phase II status and also provided a timeline for system design. The Phase II system will include groundwater extraction, treatment, and discharge system to capture the RE108 Area Hotspot groundwater near the downgradient edge. Water will be treated to drinking water standards via air stripping and granular activated carbon. The Navy is anticipating discharging into two recharge basins and are currently conducting infiltration testing and groundwater modeling to determine flow. The system should be in place by 2023.

ONSITE GROUNDWATER SAMPLING FOR PRELIMINARY ASSESSMENT/SITE INSPECTION FOR RADIUM, PFAS, AND 1,4-DIOXANE

Mr. Murray, Navy, provided an update of the onsite groundwater sampling for the Preliminary Assessment/Site Inspections for radium, PFAS and 1,4-dioxane. The presentation is included in Appendix D.

Radium Sampling results in onsite groundwater:

Most of the samples (94%) were below the United States Environmental Protection Agency (USEPA) safe maximum level of 5 picocuries per liter (pCi/L). Ten samples exceeded the USEPA safe maximum level at seven monitoring well locations, with concentrations ranging from 5.1 to 9.5 pCi/L. Sample results indicate the radium is likely from a natural source, and it is unlikely that a release of radium has occurred.

PFAS Sampling results in onsite groundwater:

Sampling results from three events indicated that 94% of the results were below the USEPA Lifetime Health Advisory (LHA) of 70 nanograms per liter (ng/L). Perfluorooctanoic acid (PFOA) concentrations ranged from non-detect to 99 ng/L, with USEPA LHA exceedances in two monitoring wells. Perfluorooctanesulfonic acid (PFOS) concentrations ranged from non-detect to 147 ng/L, with USEPA LHA exceedances from one monitoring well. Surface Water samples were collected for PFAS but the USEPA has not developed a LHA or any other criteria for PFAS in surface water.

1,4-Dioxane Sampling results in onsite groundwater:

All groundwater sample results were below the current NYSDOH maximum contaminant level (MCL) of 50 micrograms per liter (µg/L). Seven well samples were above the proposed MCL of 1 µg/L, which is under review. Concentrations ranged from non-detect to 6.4 µg/L.

QUESTIONS AND COMMENTS

Following the technical presentations, the meeting was opened for follow-up questions and discussions. Mr. Sobolow offered the floor the RAB members to ask questions before the resident questions were discussed. The discussion questions and answers are below:

- 1. For Site 1 on-property can the sheet piling installation timeframe be changed from 7am to 8am?** Mr. Murray responded that the Navy can change the time from 8am to 5pm.
- 2. While the remedial action at Site 1 is in process is there a specific phone number residents can call if they have any issues such as their vehicle being covered with dust?** Mr. Deane replied there is signage and posting on the fence with three phone numbers. The information will also be posted on the Navy website.
- 3. Are their safeguards in place to notify water districts when plume is approaching?** Mr. Murray replied the Navy provides the sampling data to the water districts and community notification documents. If groundwater results in outpost wells exceed a trigger value, the Navy issues those notifications. The Navy provides the water districts with the latest results and trends.
- 4. Is 9.5 pCi/L of radium a natural occurrence, has a concentration like that occurred in any other well on Long Island?** Mr. Murray replied, I cannot specifically answer that question, we would have to specifically look at the background study United States Geological Services (USGS) report.
- 5. What is Navy Grumman doing with wells on William street?** Mr. Murray replied Northrop Grumman are reviewing their plans with the town. The Navy does not have any involvement with these wells.
- 6. Is the Navy treating hotspots to only 1,000 ug/L and where is the discharged water going?** Mr. Murray replied that the extraction targets the higher concentration but will typically pick up groundwater with less volatile

organic compounds (VOCs). After treatment the results are below drinking water standards. GM-38 phase I water goes into the Arthur Ave recharge basin. The Navy monitors the basin to make sure the basin can handle the load. The Navy will follow the same process for Phase II.

- 7. How will the treated water from Phase II travel to the recharge basins?** Mr. Murray replied the water will travel in piping along Hicksville Rd and Seamans Neck Road and discharge into two recharge basins.
- 8. Will new pipes be used or will existing stormwater pipes be used?** Mr. Murray replied two sets of pipes will be used- one from the extraction well which will be a double lined pipe, then treated water will be in single lined pipe to the recharge basin. Existing stormwater systems will be used as feasible.
- 9. If there is existing piping will it be tested for leaking?** Mr. Murray replied the Phase I system will have new pipe until it reaches RW-03 then use existing piping to GM38. The pipeline will have an active leak detection monitoring system.
- 10. When will recovery start for Phase I and II, and how long will it take to reduce the VOC levels?** Mr. Murray replied Phase I will begin in 2019 but the Navy may not be able to install the pipeline due to an easement. For Phase II the Navy can start the pipeline from the treatment plant to the basins by end of 2022.
- 11. There are 3 recovery wells leading to the Phase II system, will there be additional recovery wells?** Mr. Murray replied the Navy has identified two locations for recovery wells. Each location will have two wells, screened intervals at two locations, so four extraction wells at different depths at two locations near the leading edge of the plume. For Phase I there are three easements, but the process has been stalled due to access agreements.
- 12. When you discharge treated water does the Navy test for 1,4-dioxane?** Mr. Murray replied the Navy does not sample effluent for 1,4-dioxane, they sample the influent. For the GM38 system the Navy has completed a pilot test to treat 1,4-dioxane and are looking at treatment alternatives that can break down the 1,4-dioxane.
- 13. Where else has dioxane been found and what is the extent, and has it been tested at VPB and monitoring well locations and for how long?** Mr. Murray replied the Navy cannot comment on the extent of 1,4-dioxane because that is unknown, we are sampling for VOCs in the VPBs and monitoring wells.

- 14. Has radium from aircraft dials been tested as a baseline? Would flakes of Radium Paint match our samples? What is the baseline pCi/L of Paint?** Mr. Murray replied, the Navy has not tested flakes of radium from aircraft dials as a baseline. What we use now is to see if there has been a release of radium. The best indications of a release of radium is by sampling groundwater multiple events at multiple depths and the Navy is not seeing evidence of a release.
- 15. How do monitoring wells show vertical extent of groundwater contamination and how often are they sampled over time?** Mr. Murray replied the Navy takes a sample at approximately every 20 feet in VPBs. The Navy uses monitoring wells to track migration. Some results from monitoring wells near the Onsite Containment System (ONCT) have been decreasing, likely due to the ONCT. Some groundwater monitoring well results in the middle of the plume are staying constant, while some groundwater monitoring well results to the south are increasing. The Navy analyzes how the results are increasing and how fast.
- 16. What is the status of the hydraulic curtain?** Mr. Pelton replied NYSDEC is still working on a comprehensive plan for hydraulically containing the entire plume and it will be completed in the near future.
- 17. Can the process of drilling the VPBs change the characteristics of the plume?** Mr. Murray replied the VPBs do not create pathways for contamination. The Navy drills a small diameter hole then it the hole is sealed and grouted from the bottom to the top. The VPBs do not penetrating any big clay layers the drillers stop drilling at the Raritan Clay Confining Unit.
- 18. What will it take for no more VOCs to exist in the plume?** Mr. Murray replied the Navy cannot answer that question.
- 19. Will the installation of additional VPBs and monitoring wells stop plume?** Mr. Murray replied drilling VPBs and monitoring wells will not stop the plume but in order to address the plume we need to know where it is and how it is moving.
- 20. Can we ever expect the plume to be below MCLs?** Mr. Murray replied the Navy hopes to eventually have all the groundwater results exhibit results below the MCLs, however the plume diffuses and impedes the treatment system, so the timeframe is difficult to predict.
- 21. Does the plume have an impact on south shore beaches?** Mr. Murray replied that is unknown.

- 22. If the plume goes through Farmingdale and Massapequa, where is southern edge of the plume?** Higher concentrations of the plume are in center, lower concentrations are downgradient. The Navy is assembling a report to Congress where all the VOC results are reported and contains the most current depiction of the plume. The plume is still migrating to the south.
- 23. Can you tell us what is going on at Bethpage Water District (BWD) Plant 6?** Mr. Boufis replied BWD is doing treatment system upgrades. The old treatment plant has been demolished and a new state of the art treatment system and building are in the process of being built.
- 24. How large is the plume?** Mr. Brayack replied that the total plume is approximately 3,000 acres. It starts south of the Northrup Grumman property to approximately 3 miles north of Southern State Pkwy. It is approximately a mile to a mile and half wide, centered on Hicksville Road.
- 25. Does the project funding have enough money to complete the treatment?** Mr. Murray replied Phase I is fully funded, and Phase II is budgeted.
- 26. Will BWD have to put a tariff on customers?** Mr. Boufis replied that BWD has been working with Congressman Suozzi and Senator Schumer on funding and Plant 6 is funded by the Navy. It is a 2-year project and is 5 months ahead of schedule. BWD reached out to NYDEC and the state and received a few grants and funding through a bond. BWD is seeking reimbursement from the Navy or Northrup Grumman.
- 27. In light of the high levels of contamination at Bethpage Community Park (BCP), will there be further investigation and what is the treatment?** Mr. Pelton replied that a couple remedial action alternatives are being evaluated for an in-situ thermal remedy to remove VOCs from 40 to 50 ft bgs that will be captured from extraction wells. Phase 2 will be connecting all the thermal wells from summer to fall. Next step is the excavation of PCBs and metals in the former ball field area and access road, like site 1. Excavating and transporting will start spring of 2020 and will take approximately one year to complete.
- 28. Does rainfall effect sample results?** Mr. Orient replied that if it is a shallow water table sample then rainfall can have an effect. The Bethpage plume is deep and at those depths it would not affect sampling results.
- 29. Is there a water filter that can be installed in your home?** Mr. Boufis BWD filters all the drinking water, so it is not necessary there to add a filtration system in your house. In 2010, BWD lost their chlorination waiver but there are simple

alternatives to eliminate the chlorine from the water such as; a carbon filter and letting the water sit out.

30. Why is the Navy/Northrop Grumman not using BWD Plant 6 facility for treatment for the RE108 extraction well, since it passes through Plant 6?

Mr. Boufis replied that BWD has discussed with the Navy and Northrop Grumman, that BWD needs those wells to supply drinking water, until we have replacement capacity, we cannot turn those wells over to the Navy or Northrop Grumman.

31. Since radium and PFAS are measured in raw water. What are the concentrations in treated water? Mr. Boufis replied that BWD is constantly testing and as technology gets more advanced the results will be more accurate, some sample taps could influence results. BWD has not seen any high numbers but we are tracking it.

32. Has the PFAS plume been delineated? Mr. Murray replied that the Navy does not have PFAS results off Bethpage property, just on property PFAS results. Mr. Boufis added that the water districts have been working closely with the Navy, NYSDEC, NYSDOH and at any time a request is made for a well to be sampled they will sample it for us. We are all working together to get rid of the plume.

33. I understand that the current classification for BCP is “Brownfields”, that must be erroneous as it would preclude that property was being used as public parkland. Public parkland can only be changed from public parkland to another status by action of NY State legislature. Was that done here? The deed from Northrop Grumman to BCP is “for recreation and park use”. How could that be changed? Mr. Karpinski replied that all the data that comes in and goes through me and NYSDOH. The status does not include the park from continuing the park to operate as it currently operates. Ice skating rink has a sub slab depressurization system. Concentrations in soil are such that it does not prohibit it to be used as a park.

34. How much soil is being removed from BCP? Mr. Pelton replied NYSDEC does not know exactly how much soil Northrop Grumman has removed, but the estimate is from 35,000 to 40,000 cubic yards.

35. Why is there no long-term maintenance on site 1? Mr. Murray replied that the Navy will replant and restore the berm and fence it off. The Navy will have to monitor that the remedy worked through land use controls (LUCs), existing monitoring wells and new monitoring wells and reassess every 5 years.

- 36. How secure will the Site 1 area be for young children?** The Navy will construct a 5-foot high barrier with 5-foot high fence, so no children will enter the site.
- 37. Is the Site 1 remedy emulating a previous project or another project?** Mr. Murray replied this project is unique to Bethpage. The Navy is using VPBs for groundwater models to predict flow.
- 38. Will inhaling the dust from Site 1 cause health issues?** Mr. Karpinski replied that work has to stop when there is dust in the air that could potentially contain polychlorinated biphenyls (PCBs). The Navy is taking steps to prevent the dust from being created. Currently, a warehouse is being built and dust is being generated from the truck traffic near site 1, but the dust is being controlled.
- 39. Has the Navy identified another naturally occurring detection of radium on long island over 5 pi/L?** Mr. Murray replied the Navy does not have a site-specific background for radium.
- 40. What is the rate of the VOC plume migration to the south?** Mr. Murray replied the plume migration is slightly less than a foot per day, 100 to 300 ft per year.
- 41. Is drinking water safe?** Mr. Boufis replied state and county health departments regulate the standards and the water districts far exceed the regulations.
- 42. Can the community trust the testing and controls that are in place can?** Mr. Boufis replied that BWD takes samples and brings them to a certified lab. The lab sends the results back to the water district and the health department and the results are shared. BWD over samples and has proactively taken wells off line.
- 43. Do we have an idea when NG stopped dumping?** Mr. Murray replied the Navy does not have that information.

CLOSING REMARKS

Following the questions and answer session, Mr. Sobolow the RAB Co-Chair announced the RAB was looking for new members and if anyone was interested in joining to see him after the meeting or contact him directly. Mr. Murray thanked everyone for attending the meeting and announced the next Bethpage Navy RAB meeting would be in the Fall of 2019.

APPENDICES

APPENDIX A
17 APRIL 2019 RAB MEETING SIGN-IN SHEET

44th RAB Meeting for NWIRP Bethpage

April 17, 2018

Sign-in List

Name (Print)	Phone and/or email or address if interested in being on the mailing list	Affiliation	How did you hear about the meeting?
Laurie LUTZER	[REDACTED]	Resident	Beth Comm. Council
Chris Wenczel	[REDACTED]	Steel Equities	Email
Stephan Roy	[REDACTED]	HGS	
Sanku Dressler	[REDACTED]	DEC	Email
Mike Boufili	[REDACTED]	Bethpage Water	Email
Manfred Bohms	[REDACTED]	Steel Equities	
John Joseph Bodnar	[REDACTED]	self	News by
Jean Simone	[REDACTED]	Resident	EMAIL
SAUL ASH	[REDACTED]	resident/hydrogeologist	email
NICK VALKENBURG	[REDACTED]	UPG	email
RAGH AYOUB	[REDACTED]	—	✓
Michael Jannis	[REDACTED]	NYS Assembly	Email
Frank Russo	[REDACTED]	Medico	Email
Sal J Greco	[REDACTED]		
Kathy Brentner	[REDACTED]	Rashley	

44th RAB Meeting for NWIRP Bethpage

April 17, 2018

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Name (Print)	Phone and/or email or address if interested in being on the mailing list	Affiliation	How did you hear about the meeting?
Colleen Cullen		Rigano .com	Rigano
Donna Nogiel		Sengler Thomas	
Todd Coomars			BWA
Maryellen Todd			facebook
Theresa Wadd			email
JOHN R SULLIVAN			FACEBOOK
Judith Lee			FB
Catherine Lee			FB
Richard Lenz			
Jess Orient		T+	
Bill Deane		Apim	
Monica Smeal		Apim	

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Name (Print)	Phone and/or email or address if interested in being on the mailing list	Affiliation	How did you hear about the meeting?
Nick Rizzo			
Bill Merklin		D&B	email
Joanne Berio		Resident	email
Dawn O'Shaughnessy		Resi	word of mouth
Vincent Ferretto			
David Schwartz		Nearshore	
Jim Friedl		Resident 3rd & Sycamore	email
Cindy Proxus		Cong Suozzi	email
Lori Leistman			returnee
Teri Black			BWD
Dave Breejack		7+	
Kristi Francisco		7+	
Melissa Cushing		7+	
Jo Kreidel		Navy	
Joe Faran		Manager Edge	

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DAVID SOBOLOW	RAB CO-CHAIR		
Mike Hauptman		CITIZEN	
Rose Walker		NC Legislator	
Mike Zobel		Resolution	
MARTIN HACKER		HOMEOWNER SELF	E-MAIL
Karen Higgins		Various orgs.	Friend
Jason Peltan		NYSDEC	
Don Hesler		NYSDEC	
Steve Karpinski		NYSDEC	
Dan Silberman		NYSDEC	
Nidal Azzam		EPA	
Genoveva Munoz			email
Lilia Factor		Napoli Shkolnik	
John Lovejoy		NCDH	Email
Grey Cusumano		resident	Email
Valerie Mayer		Res.	

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Name (Print)	Phone and/or email or address if interested in being on the mailing list	Affiliation	How did you hear about the meeting?
Howard Denton			FRIEND
S D'ARCAANGELO		RAB	
Mary Devine			friend
RICH CATALANO			
Greg. Sides			
Tom Frost			E Mail + New Paper
ANTONIO RUWPA			EMAIL
John Reinhardt		TO H water	E MAIL
M. Mulka			EMAIL
Frank Spadaro		ZAD Ashford	
Susan		}	
Gia			
Theresa Colabella		Northwell	e mail
Marie Pustorino			FB
JE KREIDER		NAVY	

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Sign-in List

Name (Print)	Phone and/or email or address if interested in being on the mailing list	Affiliation	How did you hear about the meeting?
EDDIE STET		RAB	EMAIL
Bob Horan		RAB	E-MAIL
Brian Murray		Navy	—
Bill Pavane		RAB	Email
Steve Kitchen		Altice	
Larry Samberger		Altice	Email from Colleague
Frances Avnet			e mail
Stacy Renna			email
JEFF ORIENT	—	TETRA TECH NAVY	—
Richard Castle		NOVA	email
R. Del Puerto		Idonea Dunbar	E-mail
Sonia Das		Comm	e mail.
Robert Wanshan		—	E-mail
Stan Carey		Massapequa Water District	DEC
Michelle Greene		none	email

APPENDIX B
RAB MEETING AGENDA AND DEFINITIONS



Agenda for Restoration Advisory Board
Naval Weapons Industrial Reserve Plant Bethpage

Date: April 17, 2019

Time: 6:30 PM

Location: Bethpage Community Center-103 Grumman Road West, Bethpage NY

Open House: 6:30 PM to 7:00 PM - general questions from the public

RAB Presentations: 7:00 PM to approximately 8:00 PM

- Ground Rules – The Management Edge
- Introduction of RAB members and Regulators – Navy Co-Chair/Community Co-Chair
- Distribution of Minutes and Status Update – Navy
- OU-4 Site 1 Former Drum Marshalling Area Remedial Action Construction Update – APTIM
- OU-2 Groundwater Investigation – Tetra Tech
- RE108 Area Hotspot Treatment Update – Tetra Tech
- Onsite Groundwater Sampling for Preliminary Assessment/Site Inspection for Radium, PFAS, and 1,4-Dioxane - Navy

RAB questions following presentations: 8:00 PM to approximately 8:30 PM

- Questions – Community Co-Chair
- Closing remarks – Navy

Copies of information can be found at the document repository located at the Bethpage Public Library, 47 Powell Avenue, Bethpage NY 11714 (516-931-9307) or online at <http://go.usa.gov/DyX>

Definitions and Clarification of Terms, Acronyms and Abbreviations

For the Bethpage Restoration Advisory Board (RAB)

- **Basic:**
 - VOC--Volatile Organic Compounds:
 - Chlorinated solvents (typically used as degreasers in manufacturing)
 - Effluent
 - Is an outflow of water from a treatment source
 - Free Product
 - Substance (usually oil or gasoline) that exists in its own state-it is not dissolved in water.
 - Soil Vapors
 - Gases contained in the pore spaces of soil
 - Capture Zone
 - Area of water whose flow direction is influenced by pumping
 - Ground Water
 - Water flows through open pore spaces of soil
 - Down gradient
 - The direction of groundwater flow
 - Plume
 - An area that impacts from chemicals are detected in
 - Raritan Clay Layer
 - A geologic horizon - Clay that is approximately 800-100 feet below ground surface – accepted to be the bottom of the Magothy aquifer
 - Aquifer
 - an underground layer of water-bearing permeable rock or unconsolidated materials
 - Trichloroethylene-
 - Volatile organic compound of concern (used as a degreaser in manufacturing)
 - OU- Operable Unit
 - BGS - Below Ground Surface
 - PCB- Polychlorinated Biphenols (used as transformer cooling fluid)
 - NG- Northrop Grumman
 - NWIRP-Naval Weapons Industrial Reserve Plant
 - No. 6 Fuel Oil- tar
 - Hot spot
 - Area where trichloroethylene is at a concentration greater than 1000 parts per billion
 - BWD Plants- Bethpage Water District Plants

- **Data Gathering:**

- Gauging- measurement of ground water levels from top of ground surface
- In-situ – in place
- Delineate- define boundaries
- VPB- Vertical Profile Boring
- Monitoring Well- (typically 2-6 inches in diameter) a well used to provide a “snapshot” of water quality when sampled

- **Treatment Technologies:**

- Biosparging
 - Removal of chemicals by breaking them down with bacteria
- Steam Injection/Free Product Recovery
 - Heating of oil that has a tar like consistency with steam to make it flowable (syrup like consistency) so that it may be removed
- Air Stripping
 - Removal of dissolved volatile organic compounds from water by transferring it into air
- Land Use Controls
 - Action that restricts what land can be used for
- Vapor Phase treatment-
 - Removal of a chemical from gas; used to remove trichloroethylene from air vapor
- Biodegradation
 - Reduce a chemical by changing conditions so that bacteria can break down the chemical
- On-site Containment Treatment System (ONCT)
 - Series of wells that remove and treat groundwater at the southern edge of the former Northrop Grumman property
- SVECS—Soil Vapor Extraction Containment System
 - Vacuum for volatile chemicals trapped in the air between soil particles; used to remove trichloroethylene
- Equalization Tank
 - Tank for mixing
- Liquid Phase Granular Activated Carbon Polishing
 - Removal of remnants of a volatile chemical by passing liquid through carbon; used to remove trichloroethylene

- Recharge basin
 - Sandy basin that receives storm water and allows water to filter down into the ground
- Recovery Well
 - (Typically larger diameter 12 to 36 inches) a well used to recover oil or water containing chemicals
- **Regulatory:**
 - Proposed Plan- Plan of action that is sent to the state for approval prior to the Final Record of Decision
 - Feasibility Study- collection of data used to determine if a remedy will work
 - ROD –Record of Decision
 - Compliance sampling- collection of samples to demonstrate that chemicals are below regulatory levels
 - CERCLA- **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** – the legal mechanism for cleaning up inactive hazardous waste sites at DOD (Depart of Defense) facilities, this is the defining regulation for the Navy’s Environmental Restoration (ER) Program at NWIRP Bethpage under NYSDEC authority.
 - RCRA- **Resource Conservation and Recovery Act (RCRA) Corrective Action** – a statutorily required cleanup program, similar to CERCLA, that addresses active solid waste management units and contaminated media as a condition of RCRA permits - NWIRP Bethpage has a RCRA Permit with NYSDEC
 - NYSDEC- **New York State Department of Environmental Conservation (NYSDEC)** provides regulatory review and approval of Navy actions at NWIRP Bethpage
 - NYSDOH- **New York State Department of Health (NYSDOH)** assists NYSDEC.
 - USEPA- **United States Environmental Protection Agency (USEPA)** Provides federal review of the Navy actions.

APPENDIX C

POSTERS

SITE 1 – FORMER DRUM MARSHALLING AREA

Storage Area:

- Drums containing chlorinated and non-chlorinated solvents
- Electrical Transformers and Autoclaves containing polychlorinated bi-phenyls (PCBs)

Cesspools:

- 120 abandoned cesspools
- Used to discharge sanitary wastewater from Plant No. 3

Drywell 20-08

- PCB in soil contamination found 20-30 feet deep



Contaminants of Concern

- PCBs
- Volatile and Semi-Volatile Organic Compounds (VOC, SVOCs)
- Metals – Arsenic, Chromium, and Hexavalent Chromium
- Pesticides

Remedial Action Plans for Soil Remediation

- Excavate and dispose of PCB-contaminated soils throughout Site 1
- Removal of cesspools and drywell 20-08
- Install a buried cover to reduce future leaching of contaminants from unsaturated soil to the groundwater
- Backfill excavated areas and restore parking and grassy areas to existing conditions

Remedial Action by the Numbers

- Over 39,300 cubic yards of contaminated material will be excavated
- Contaminated soils will be transported off Long Island and disposed of in several states depending on characterization of soil contamination
- Soil will be transported by trucks and rail cars

Timeline

- Met with residents: February 6, 2019
- Mobilization and Site Setup: Ongoing
- Sheet Piling Install: Beginning April 2019
- Excavation: Spring 2019 – Winter 2019/20
- Liner Installation: Fall 2019 – Winter 2019/20
- Transportation and Disposal: Spring 2019 – Winter 2019/20
- Restoration: Spring 2020

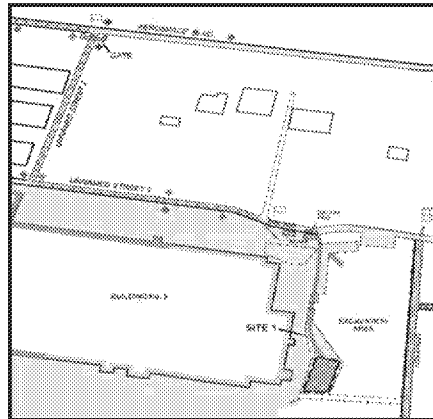
SITE 1 – FORMER DRUM MARSHALLING AREA

Local Impacts from Site 1 Soil Remedial Action

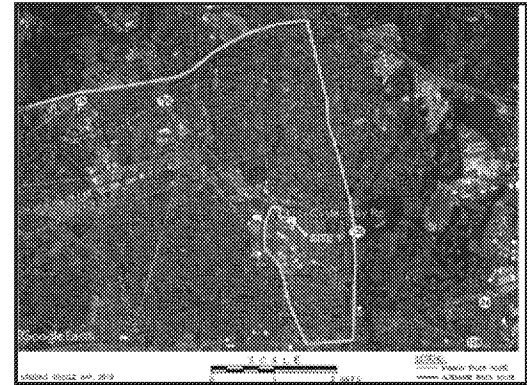
Traffic

- Traffic Control Plan provided to minimize impacts to local roads
- Approximately 3,900 truck trips required for soil removal and clean fill dirt delivery
- Where feasible, backhauling of clean fill dirt to reduce overall truck trips
- Traffic control signs will be installed on and off the NWIRP Property to direct trucking traffic

On-Site Traffic Plan



Off-Site Traffic Plan

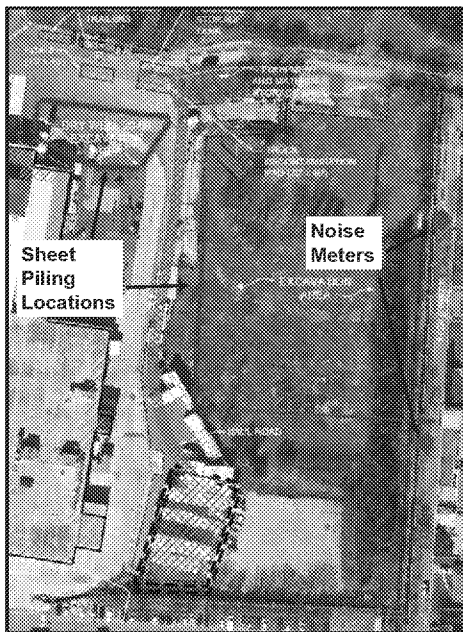


Noise (All Construction)

Hours of operation will be 7:00 AM – 5:00 PM Monday – Friday

Weekend work will be avoided, except when necessary to minimize impacts to surrounding parties

Noise levels will be monitored and will not exceed 85 decibels at the site perimeter

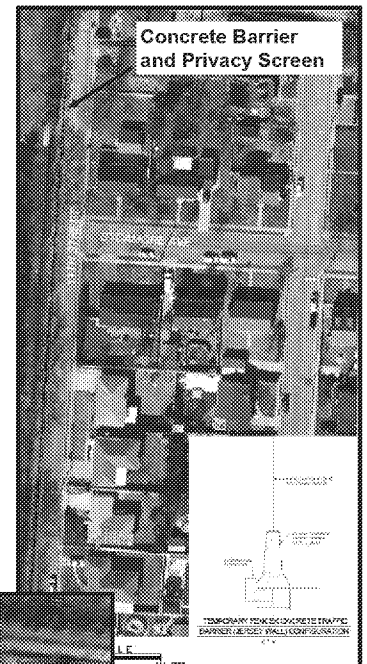


Noise - Sheet Pile Installation

- Installation of sheet pile for excavation safety in the drywell and deep excavation areas
- Minimizes overall excavation footprint
- Installed with a vibratory hammer
- Expected duration 3 months

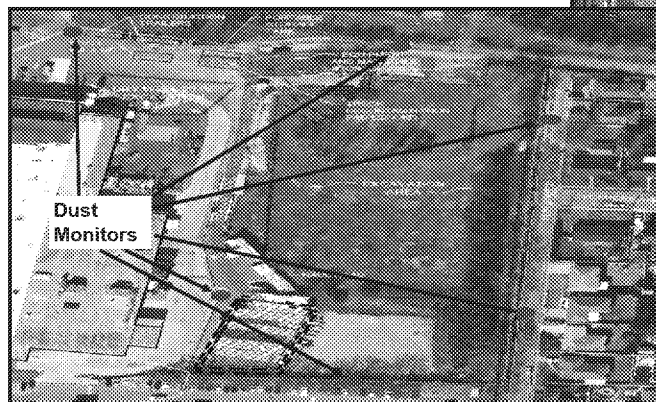
11th Street Impacts

- Installation of privacy screen and concrete barrier at Site 1 boundary
- Concrete barrier will extend 24 inches onto 11th Street
- During final phases of excavation, tree line will be removed
- Tree line will be replaced



Dust Control

- Dust monitoring will occur during all construction activities to monitor dust generation on site
- Monitoring will occur upwind, downwind, and at residential points
- Soil or debris will be covered in trucks
- Water or other standard products will be applied to soil piles to reduce dust on site



Navy 2003 RECORD OF DECISION (ROD)

The Navy, with regulator concurrence, issued its federal cleanup and management plan to address OU2 groundwater contamination resulting, at least in part, from the NWIRP operations.

Approved Groundwater Remedy:

- Legal Restrictions on Groundwater Use
- Groundwater Monitoring and Hotspot Treatment
- Public Water Supply Protection Program

Groundwater Monitoring

PURPOSE

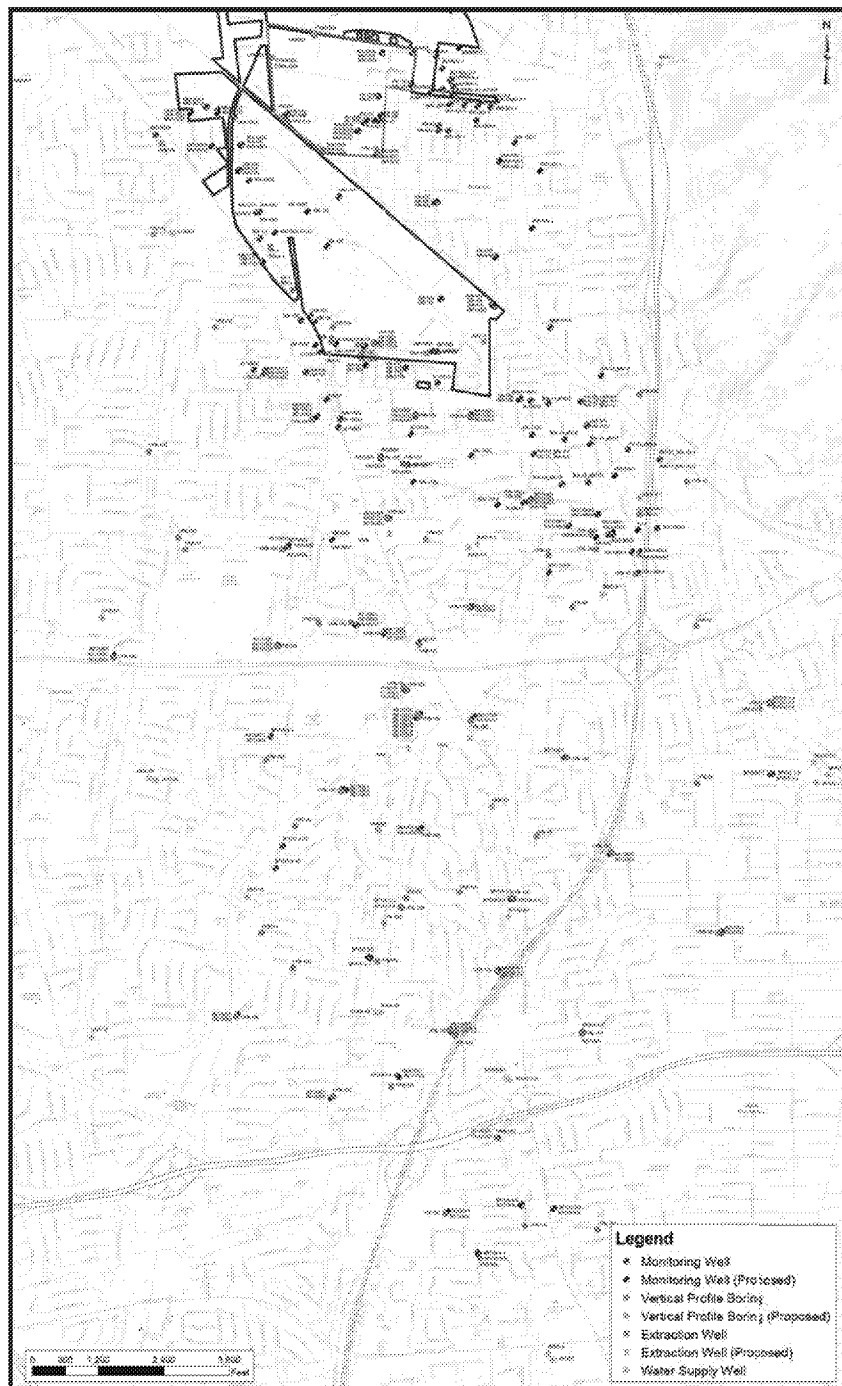
- Determine and monitor groundwater contamination south of NWIRP Bethpage and Northrop Grumman (NG) property
- Implement "hot spot" remedy(ies) as needed
- Provide wellhead treatment for potentially impacted public water supplies
- Coordinate with NG to help it address its OU2 responsibilities under the 2001 NYSDEC ROD

MONITORING COMPONENTS

- Requires property access agreements
- Vertical Profile Borings (VPB) - quickly screen areas for the presence, depth, and concentration of contamination
- Permanent Monitoring Wells (MW) - confirm presence/absence of contamination and develop trends
- Water levels measurements - support U.S. Navy modeling and capture zone analysis

Vertical Profile Borings

- Locations selected by the Navy and NYSDEC
- Generally located on township or county right-of-ways
- Advance notification provided to nearby residents
- **12-inch** diameter hole drilled into the ground
- Final boring is **860 to over 1,000 feet deep** (extending to the Raritan Clay Layer)
- Drilling is stopped at selected depths and a device is lowered to sample the groundwater
- **44 groundwater samples** are collected per boring and analyzed for VOCs
- **4 to 8 weeks** to complete a boring/well



2000-2019: Navy installed over 57 borings and over 103 monitoring wells. Data is shared with NYSDEC, public, and other stakeholders. Additionally, NG has installed its own borings and monitoring wells that also provide data to the OU2 Program.

HOT SPOT TREATMENT

Hot Spots are areas with greater than 1,000 parts per billion (ppb) trichloroethene (TCE), which is the primary Volatile Organic Compound (VOC) contaminant in the OU2 Groundwater

GM38 Hot Spot

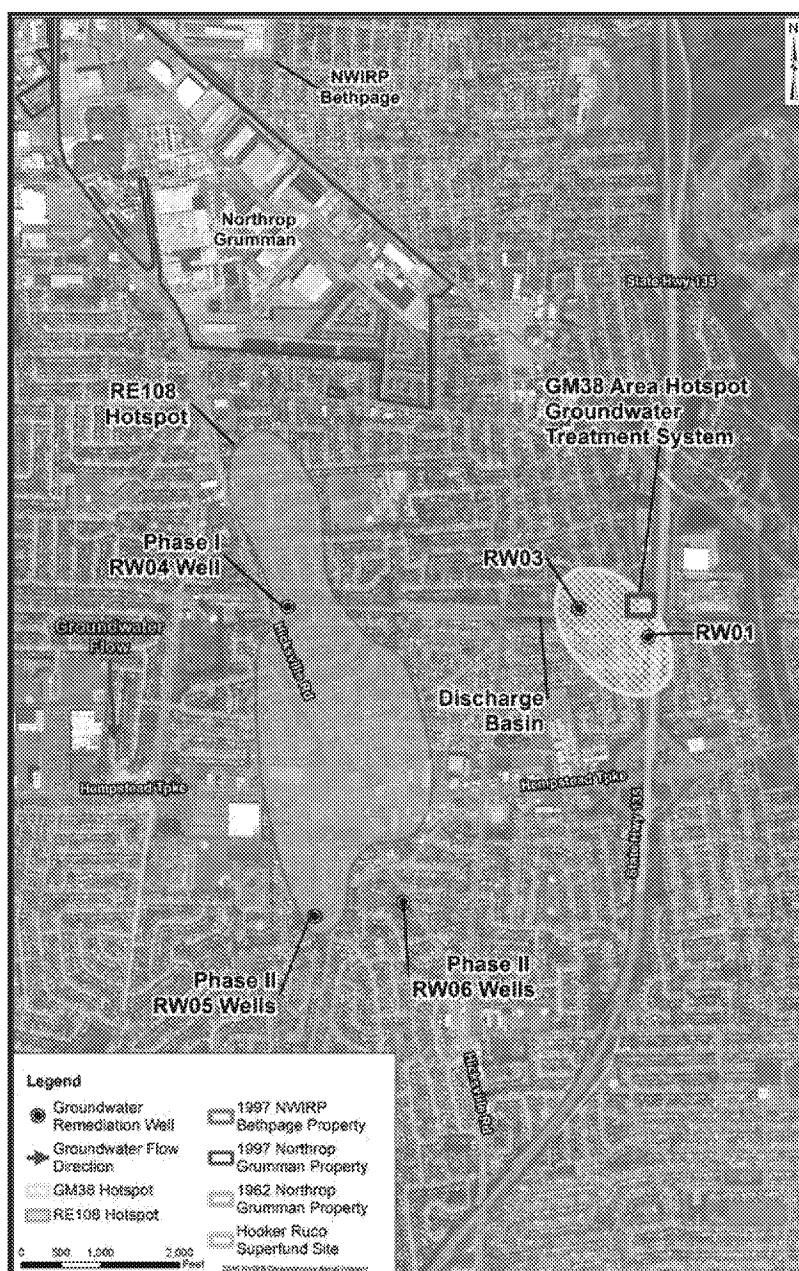
- Approximately 1.6 miles southeast of former NWIRP Bethpage and former Northrop Grumman (NG) property
- Groundwater flows from the former NG and NWIRP facilities to the hotspot area
- Originally 38 acres in size
- Variable depths between 300 to 500 feet deep
- Now less than 200 ppb; groundwater concentrations have decreased by over 80 percent

GM38 Groundwater Treatment System

- Installed, operated, and maintained by the Navy in accordance with the Navy's OU2 ROD
- Operated by the Navy since 2009 to remove VOCs in groundwater to achieve drinking water standards
- Recovery well pulls groundwater to the surface
- VOCs are then removed from the groundwater by air stripping and carbon filters
- Samples are collected from eight monitoring wells to determine the system's effectiveness
- Approximately 4.3 billion gallons of groundwater containing over 5 tons of VOCs have been captured and treated

RE108 Phase I and Phase II

- Identified by the Navy 2011; located north of Hempstead Turnpike
- Approximately one mile south of former NWIRP Bethpage and NG property
- Approximately 500-750 feet deep
- Phase I construction pending final access agreements
- Phase II design is in process



PUBLIC WATER SUPPLY PROTECTION

Navy works with NYSDEC, water districts, and NG to use groundwater monitoring results to predict potential impacts to public water supply wells and install wellhead treatment systems to remove VOCs down to concentrations meeting drinking water standards

Wellhead Treatment Systems Funded by U.S. Navy

Bethpage Water District (BWD)

- Plant 5 - 1996
- Plant 6 - upgrades, 2011

South Farmingdale Water District (SFWD)

- Plant 1 - 2011
- Plant 3 - 2013

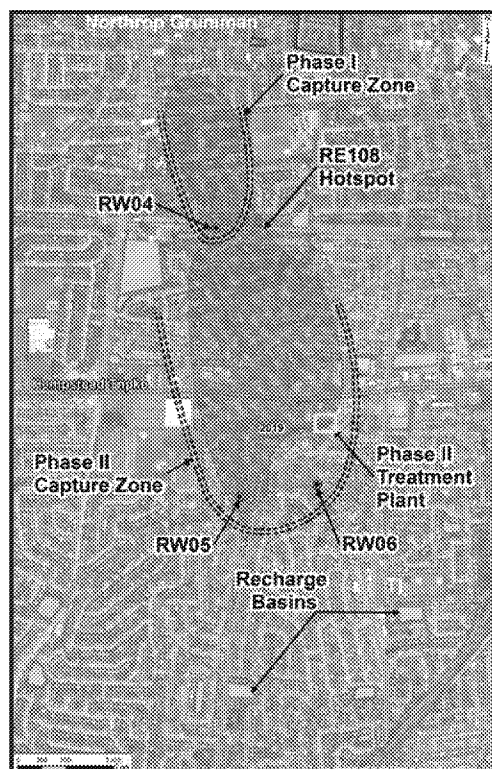
New York American Water (NYAW) Seamans Neck Rd.

- Interim system, 2012
- Full scale system, 2015

RE108 AREA HOTSPOT TREATMENT SYSTEM

Background

- Navy is addressing the RE108 Area Groundwater Hotspot
- Work is being conducted in two phases
 - Phase I** located north of Hempstead Turnpike, to address northern portion of the Hotspot
 - Phase II** located south of Hempstead Turnpike to address remainder of the Hotspot

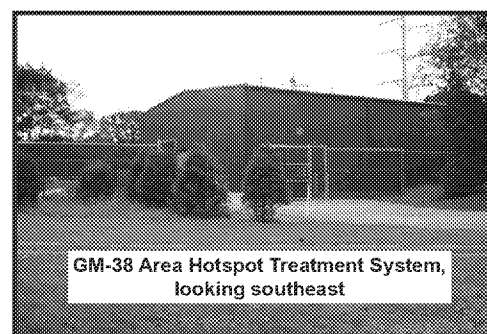
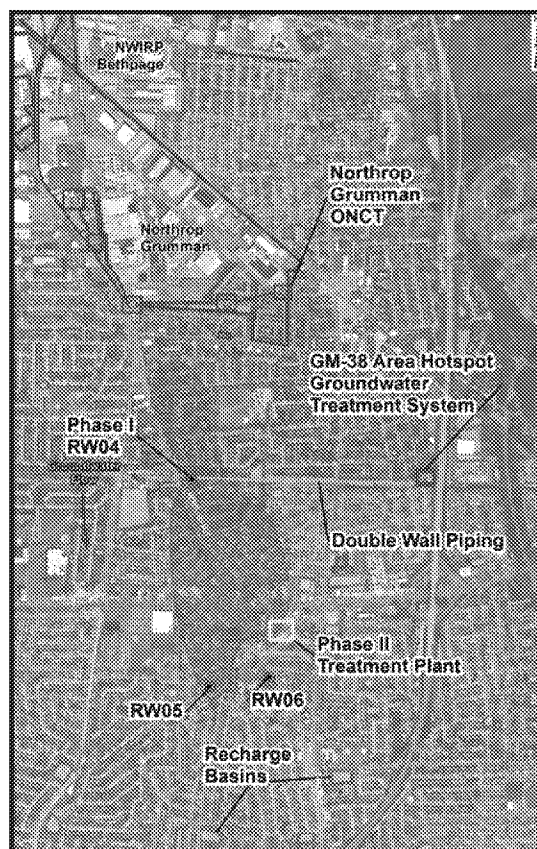


Phase I - Description

- The Phase I System would consist of an extraction well (RW4), piping along the existing utility corridor, and the existing GM38 Treatment System
- Phase I System would treat the northern portion of the plume, remove significant mass, and accelerate cleanup times
- Design is complete, and based on property access, construction (3 to 4 months) is expected to be completed in 2019

Phase II - Description

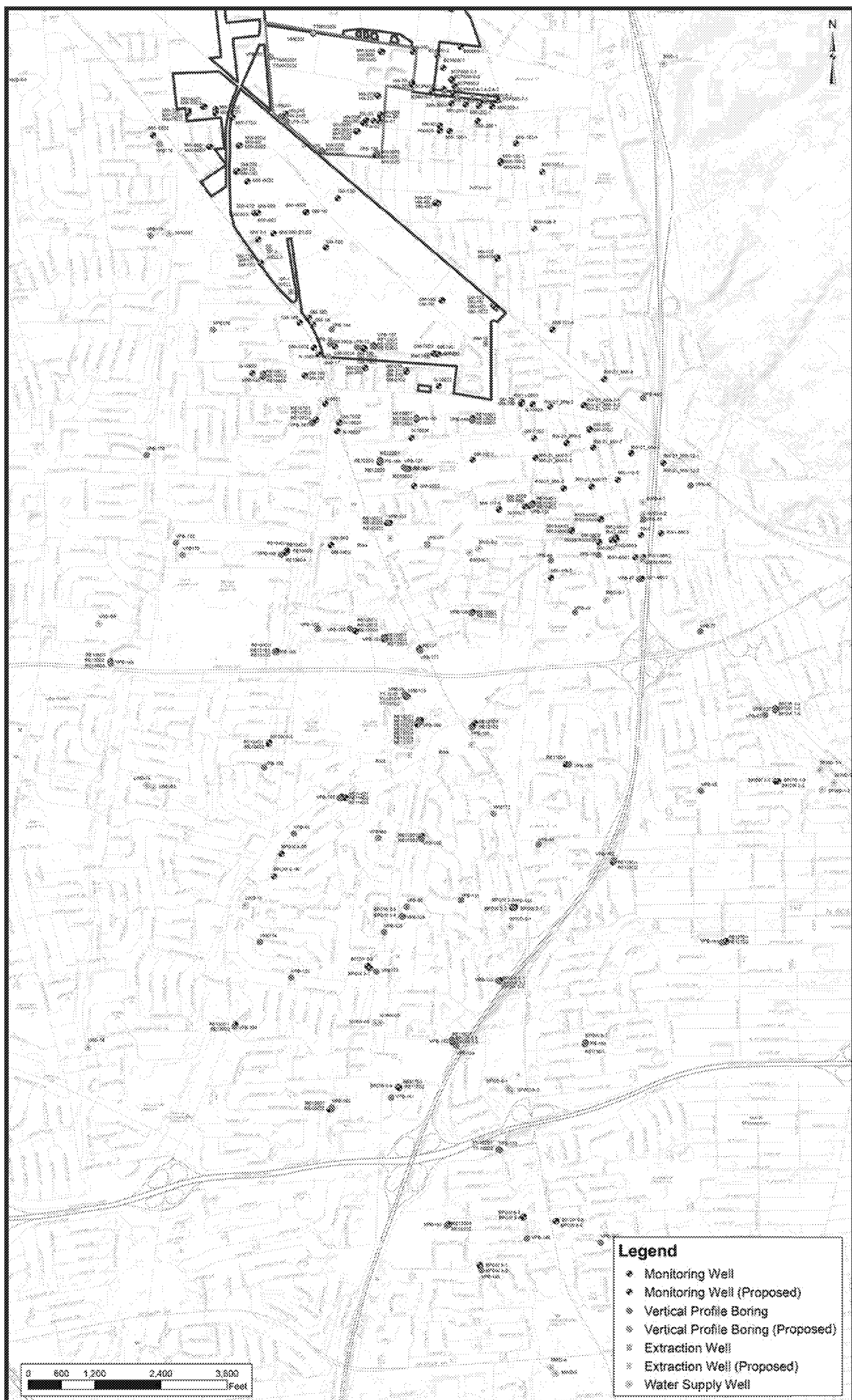
- Phase II System would consist of 2 to 4 new extraction wells (RW5A, RW5B, RW6A, and RW6B) near the 2023 projected southern extent of the RE108 Area Hotspot Capture zone
- Extraction wells would be installed in vaults, below grade
- Navy is finalizing property access for a treatment plant, plant would be similar in size to GM38 Area Hotspot Treatment System
- Pipe routes would follow existing roadways
- Treated water would be re-introduced to the aquifer through recharge basins



GM-38 Area Hotspot Treatment System, looking southeast

NORTHROP GRUMMAN ON-SITE CONTAINMENT

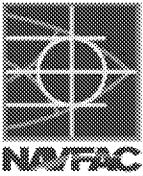
- Captures groundwater at the south and southwest edges of the former NG property to prevent further off-site movement
- System is operated and monitored by NG with quarterly and annual reports provided – Navy has no control over or involvement in environmental cleanup decisions for NG**
- VOC data indicate some contamination may be bypassing the system
- NG evaluated the effectiveness of the ONCT system in 2016 and determined that the system was operating properly
- Navy is continuing to review data to verify that residual NWIRP contamination is not migrating beyond NG's containment system.



APPENDIX D

PRESENTATIONS

AGENDA



- Ground Rules – The Management Edge
- Introduction of RAB members and Regulators – Navy Co-Chair/Community Co-Chair
- Distribution of Minutes and Status Update – Navy
- OU-4 Site 1 Former Drum Marshalling Area Remedial Action Construction Update – APTIM
- OU-2 Groundwater Investigation – Tetra Tech
- RE108 Area Hotspot Treatment Update – Tetra Tech
- Onsite Groundwater Sampling for Preliminary Assessment/Site Inspection for Radium, PFAS, and 1,4-Dioxane - Navy

RAB questions following presentations: 8:00 PM to approximately 8:30 PM

- Questions – Community Co-Chair
- Closing remarks – Navy

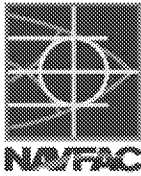


GROUND RULES
APRIL 2019 RESTORATION ADVISORY BOARD (RAB)

NAVAL WEAPONS INDUSTRIAL
RESERVE PLANT BETHPAGE
LONG ISLAND, NEW YORK

4/17/2019

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE RAB GROUND RULES



- **Respect others:**
 - One Speaker at a time
 - No interruptions
 - No side conversations
 - Listen and stay open to all points of view
- **Ask questions or make statements after all the presentations are given: (approximately 8:00)**
 - During the presentations, write any questions on the cards on your table and pass them forward, or raise them and they will be picked up and taken to the RAB Community Co-Chair.
 - They will be answered after presentations are completed.
- **Stay focused on the topics; avoid digressions.**
- **Turn cell phones and /or pagers off, or on vibrate, and respond during breaks, except for emergencies.**

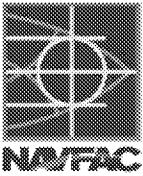


Site 1 – Former Drum Marshalling Area Remedial Action Construction Update April 2019 Restoration Advisory Board

**Naval Weapons Industrial Reserve Plant Bethpage
Bethpage, New York**

17 April 2019

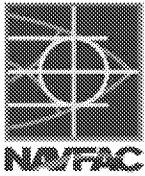
PRESENTATION OUTLINE



- Introductions – Who am I?
- Site 1 History
- Remedial Action Planning
- Remedial Action Components
- What Impacts YOU?
- Schedule



INTRODUCTIONS



- APTIM Federal Services
 - Program Office – Norfolk, VA
 - Navy Remedial Action Construction Contractor – 20+ Years
- William L. Deane, Jr, P.E.
 - Program Manager for all NAVFAC Remedial Action Work
 - 15+ Years of experience in Engineering and Remedial Construction

SITE 1 HISTORY



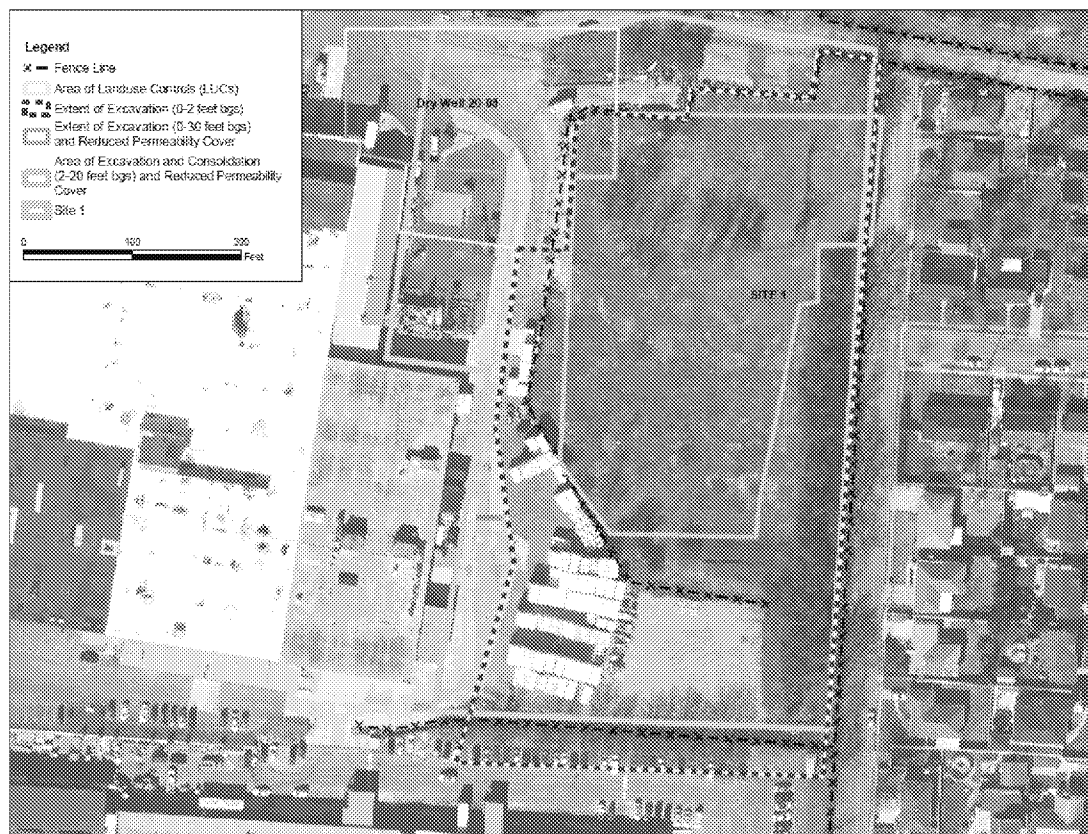
- Two former drum marshalling pads
- 120 abandoned cesspools for sanitary waters from Plant 3
- Former drywells used for storm water management system (Area of Concern [AOC] 20-08)
- AOC 20-08 is included in the Site 1 Remedial Action Construction
- Soil contaminants include:
Polychlorinated biphenyls (PCBs),
chlordane, polynuclear aromatic
hydrocarbons (PAHs), and metals

Site 1 Remedial Action focuses on soil removal

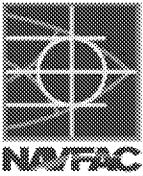


WHAT ARE WE DOING??

- The 2018 Operable Unit 4 Record of Decision selected remedy includes a limited excavation to remove and dispose of PCB-impacted soils and install a reduced permeability cover.
- Excavate contaminated soils to targeted depths
- Install a subsurface barrier, (geosynthetic clay liner) that will reduce leaching of contaminants from unsaturated soil to the groundwater
- Restore Site 1 to existing conditions

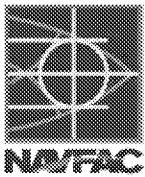


REMEDIAL ACTION PLANNING

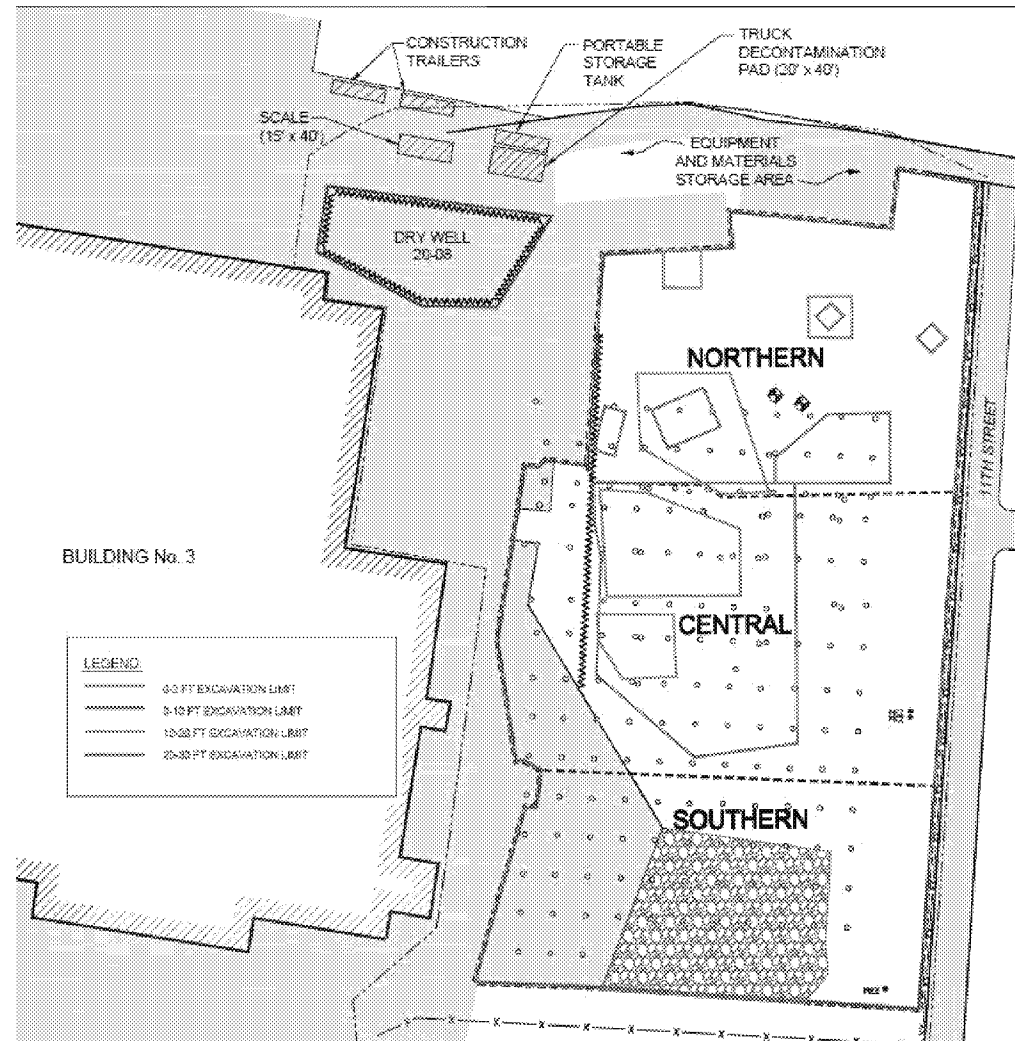


- Preparation of Project Plans
 - Remedial Action Work Plans
 - Traffic Control Plans
 - Waste Management Plans
 - Storm Water Pollution Prevention Plans, and
 - Accident Prevention and Health and Safety Plans
- Plans are reviewed and concurred on by NAVFAC and NYSDEC
- Coordination with Town of Oyster Bay (Traffic Control and Residential Impacts)
- Coordination with Steel Equities (Adjacent Tenant at former NWIRP Property)
- Informational Sessions and Community Coordination
- Progress updates to the Restoration Advisory Board

REMEDIAL ACTION EXCAVATION



- Install sheet piling
- Excavate impacted soils to targeted depths below ground surface (bgs)
- Removal of cesspools and drywell 20-08
- Install the geosynthetic clay liner over areas requiring a depth of excavation 20-foot bgs or greater.



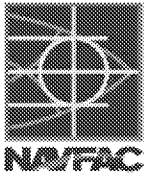
TRANSPORTATION and DISPOSAL



- Characterize wastes for disposal
- Disposal of PCB-Impacted Soils in accordance with Federal, State, and Local Regulations
- Recycled Concrete Debris
- Recycled Asphalt
- General Construction Debris
- Woody and Vegetation Debris
- Decontamination Water

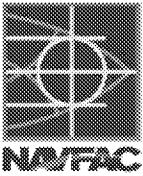
Transportation and Disposal will be a continuous activity during the
Remedy Implementation

RESTORATION



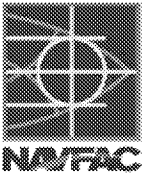
- All excavations will be backfilled to the pre-construction grade on site
- Backfill will be a continuous operation as needed throughout the project
- Replacement of existing berm along the eastern perimeter
- Install a topsoil layer where vegetative growth is planned (based on current conditions)
- Install asphalt parking areas where previously existing
- Repair existing roadways within the former NWIRP Property
- Install plantings, including large perimeter plantings to create a privacy screen along 11th Street
- Install perimeter fencing to replace previously removed fencing
- Post Construction Maintenance – 1 Year to ensure establishment of plantings and grasses

REPORTING



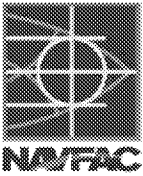
- Submit a Draft Completion Report for NYSDEC review
- The Report will include:
 - Sample results
 - Final construction documents with excavation depths
 - Waste disposal summaries
 - Certification of destruction/proper disposal (TSCA Wastes)
 - Photographic logs

MONITORING



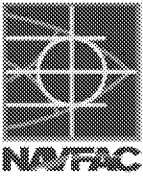
- Proposed Land Use Control Remedial Design will be submitted for NYSDEC review
 - This Design will include:
 - Protection of the cover and limitation to future activities
 - Any construction or alteration of the property is prohibited without prior approval of the Navy
 - Groundwater will be restricted to monitoring or remedial purposes
 - Future land use is anticipated to be consistent with current land use, which is primarily commercial and industrial development.

WHAT IMPACTS YOU??



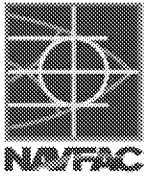
- TRAFFIC
- DUST
- NOISE
- OFF-SITE CONTAMINATION RISK?

TRAFFIC IMPACTS

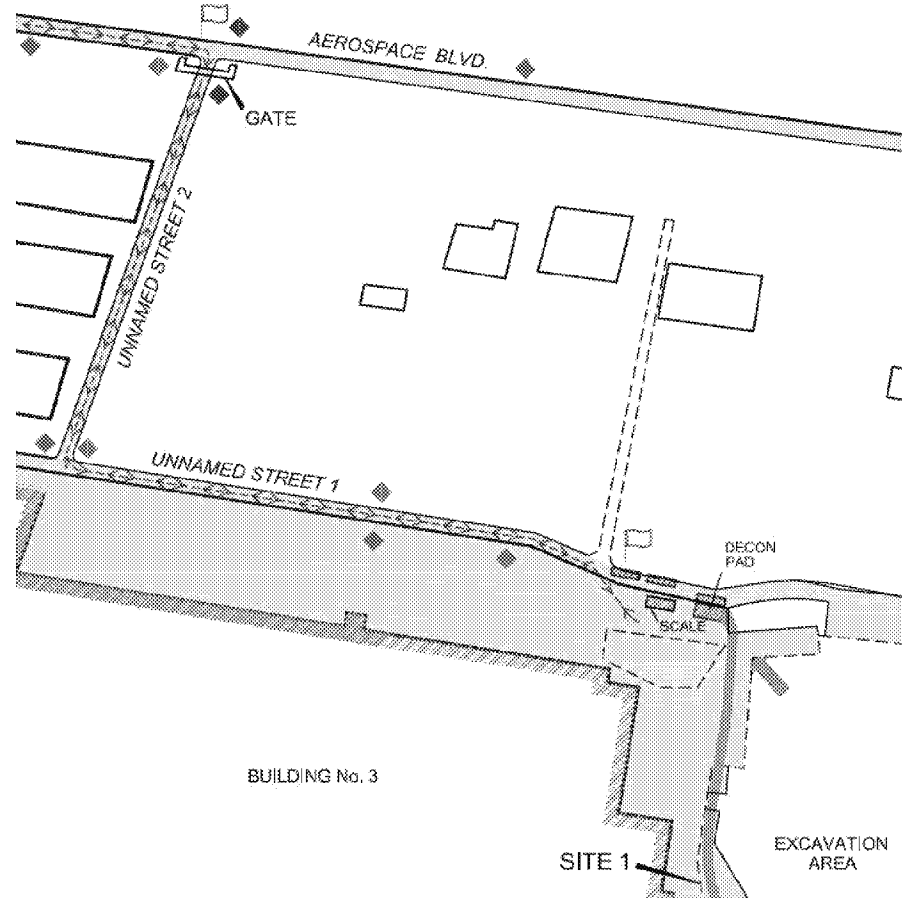


- Transportation and Disposal Activities and Backfill Delivery
 - Two activities will generate ~ 3,800 roundtrip truck trips
- Where is it going?
 - Impacted soil will be disposed of at Federal, State, and Locally permitted operating facilities based on the waste classification.
 - Hazardous Waste will NOT be disposed of on Long Island
 - Transportation will include on-road trucking and rail cars as appropriate

TRAFFIC CONTROL PLAN



- Trucking Hours – 7:00am – 5:00pm Monday - Friday
 - Signage to be installed to guide truck traffic
 - Off-Island Route via I-495



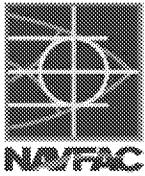
11th STREET IMPACTS



- Proximity of 11th Street to Site 1 requires encroachment onto 11th Street
- 6-foot high chain link fencing with privacy screen will sit atop 52-inch high concrete
- Construction and Informational signage
- Extends approximately 24-inches onto 11th Street
- Will not impact vehicle traffic
- Will reduce parking along the NWIRP boundary, western side of 11th Street
- In-place approximately 14 months



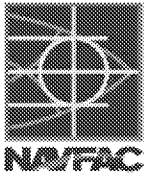
DUST



- Dust monitoring will be performed continuously during construction activities
- Monitoring locations (red dots) initially setup, subject to modification and increase based upon prevailing winds and project activities
- Dust control during construction:
 - Water, utilized as a dust suppression
 - Tarping/covering stockpiles daily
 - Commercially available cohesive applications
- Workers will also wear personal dust monitors
- Dust concentrations above 1.0 milligrams per cubic meter require shutdown until dust suppression can be increased.

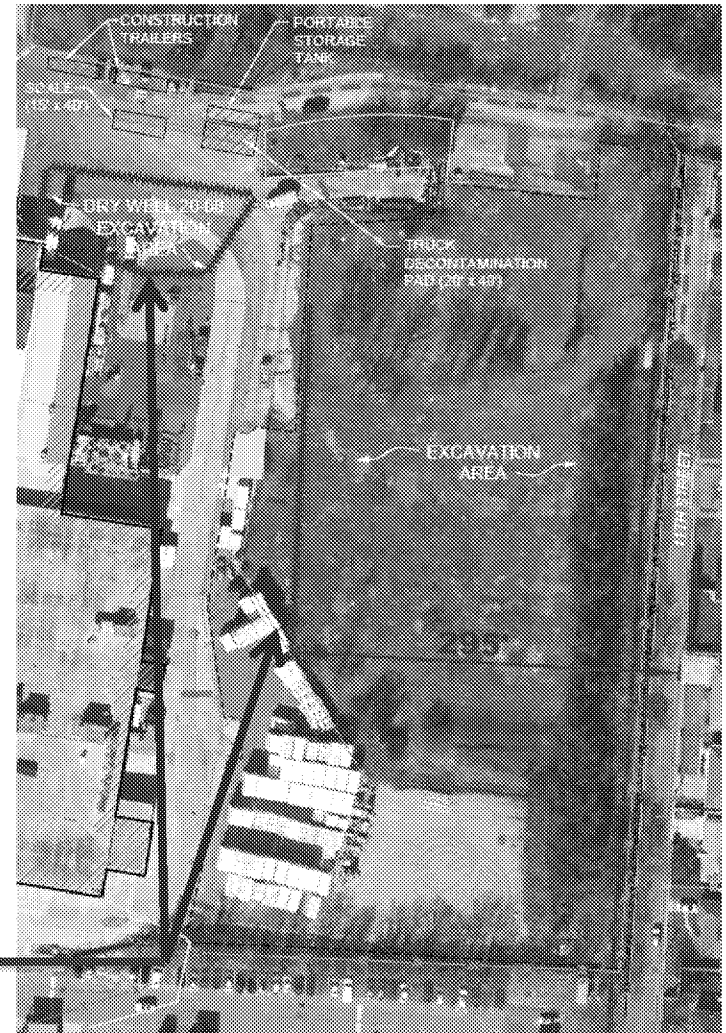


NOISE

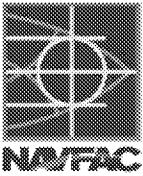


- Installation of Sheet Piling
 - Why??? – Excavation Stability in reduced footprint
 - Installed in 50 foot sections
 - Duration of installation ~ 3 Months
- General Construction Noise
 - Back Up Alarms, Banging and Clanging of equipment
 - Haul Truck Doors

Sheet Piling Locations

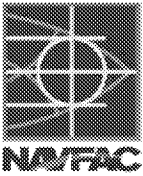


NOISE

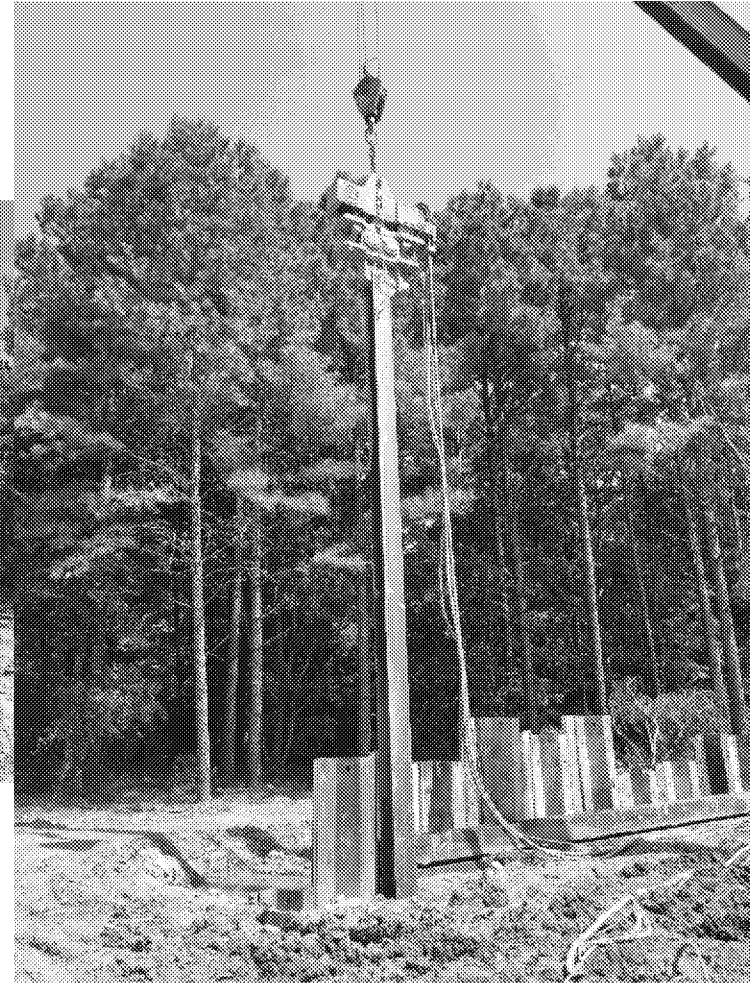


- Monitoring – Noise levels will be monitored, and will not exceed 85 decibels (dB) at the site perimeter
- What is 85 dB?
 - Car Wash at 20 feet (89 dB)
 - Propeller Plane Flyover at 1,000 feet (88 dB)
 - Diesel Truck at 40 mph from 50 feet away (85 dB)
 - Garbage Disposal (at user distance) (80 dB)

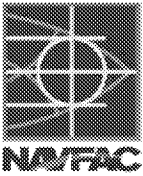
SHEET PILING



Monitoring –
Vibration monitoring
will be conducted for a period prior to the
start of sheet pile driving to record
baseline conditions and then during all
sheet pile driving in the Site 1 Area.

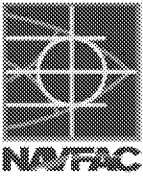


PREVENTING OFF-SITE CONTAMINATION



- Sediment Migration – Run-off from rain
 - Project is operating under a Storm Water Pollution Prevention Plan – NYSDEC
 - Employs best management practices and engineering controls to eliminate potential pathways
 - Inspected daily, and immediately following every rain event
- Haul Trucks – Dirty tires, muddy flaps, unsecured loads
 - All trucks are:
 - Decontaminated with pressure washers and rough bristle brooms prior to leaving the site
 - Inspected for rocks/debris that could fly off during transport
 - Must have tarpaulins or load protecting covers prior to leaving site with impacted soils

SCHEDULE



- Planning: Now – Spring 2019
- Mobilization and Site Setup: Spring 2019
- Sheet Piling Install: Spring/Summer 2019
- Excavation: Spring 2019 – Winter 2019/20
- Subsurface Barrier Installation: Fall 2019 - Winter 2019/20
- Transportation and Disposal: Spring 2019 – Winter 2019/20
- Restoration: Spring 2020



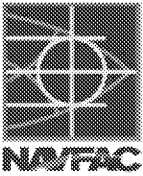
OPERABLE UNIT 2 - GROUNDWATER INVESTIGATION

APRIL 2019 RESTORATION ADVISORY BOARD

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE
LONG ISLAND, NEW YORK

4/17/2019

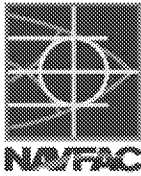
PRESENTATION LAYOUT



Operable Unit 2

1. Navy's Objectives for OU2 Investigation
2. 2009 – 2019 Vertical Profile Borings and Monitoring Wells
3. Recent Work (Performed since last Restoration Advisory Board)
4. Future Work

THE NAVY'S OBJECTIVES FOR THE GROUNDWATER INVESTIGATION



Protection of public water supplies:

- All currently planned outpost monitoring wells are in place and being monitored quarterly

Continue to Investigate the OU2 Plume:

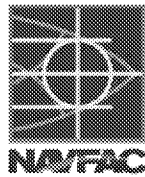
- Installation of Monitoring Wells and Vertical Profile Borings to delineate the overall plume and the RE108 Hotspot; *Very complicated geology influencing plume migration, requiring intensive investigation*
- Quarterly groundwater sampling to determine contaminant trends and plume migration

Conduct on-property testing to support Preliminary Assessment/Site Inspections

- Groundwater to be analyzed for Poly- and Perfluoroalkyl Substances (PFAS), 1,4-Dioxane, and Radium

OFFSITE GROUNDWATER INVESTIGATION –

What are the parts?

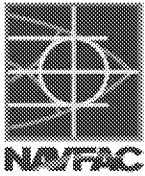


Purpose: Information is used to continue to evaluate areas for implementation of OU2 ROD actions

Program Components:

- **Vertical Profile Borings (VPB)** - quickly screen areas for the presence, depth, and concentration of contamination; drilling can take 4-8 weeks to complete
- **Installation/Sampling of Permanent Monitoring Wells** - confirm presence/absence of contamination and develop trends; drilling can take 2-6 weeks to complete
- **Data Logging of Water Levels and Evaluation of Data** - support groundwater modeling and effectiveness of recovery wells

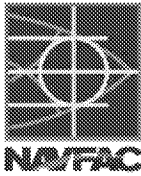
VERTICAL PROFILE BORINGS (VPB) AND WELLS – *What are they and how are they used?*



- **Vertical Profile Boring** - 12-inch diameter hole drilled into the ground
- Final boring is **860 to greater than 1,000** feet deep (extending to the Raritan Clay Layer, the bottom of the main Long Island Aquifer)
- Drilling is stopped at selected depths and a device is lowered to sample the groundwater
- **On average, 44 groundwater samples** are collected per boring and analyzed for Volatile Organic Compounds
- **Permanent wells** at different depths are then installed at the VPB location to verify the VPB results and to continue monitoring of the plume

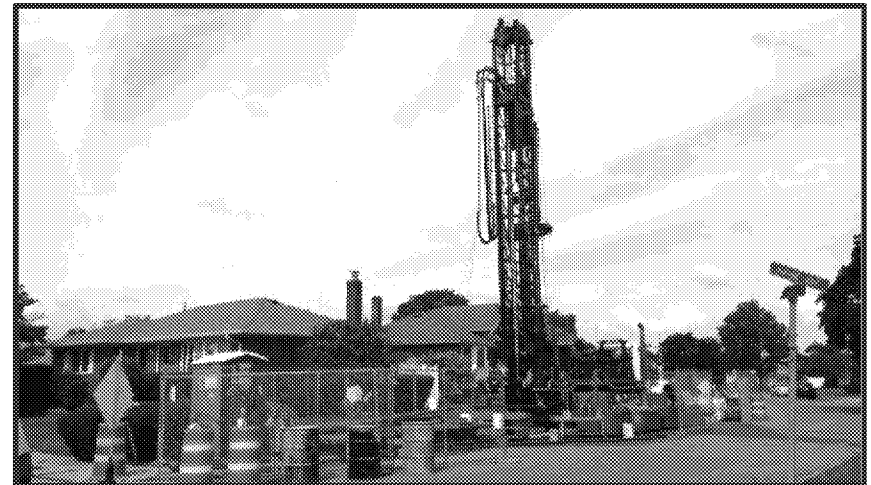
VPB AND WELL INSTALLATION PROCESS –

How are locations chosen?



Process:

- Target location selected by Navy and State
- Location is then ground-proofed (visual check onsite) by the Navy
- Drilling rig requires minimum of 100 feet with no overhead obstructions
- Municipal properties preferred (drainage basins or township right of ways)
- Considerations to minimize inconvenience to residents nearby:
 - Health and Safety concerns
 - Getting in and out of neighborhoods
 - Noise – operate on weekdays 8 to 5
- Process includes advanced notification to residence
- All waste from drilling is captured, contained, and taken away for disposal



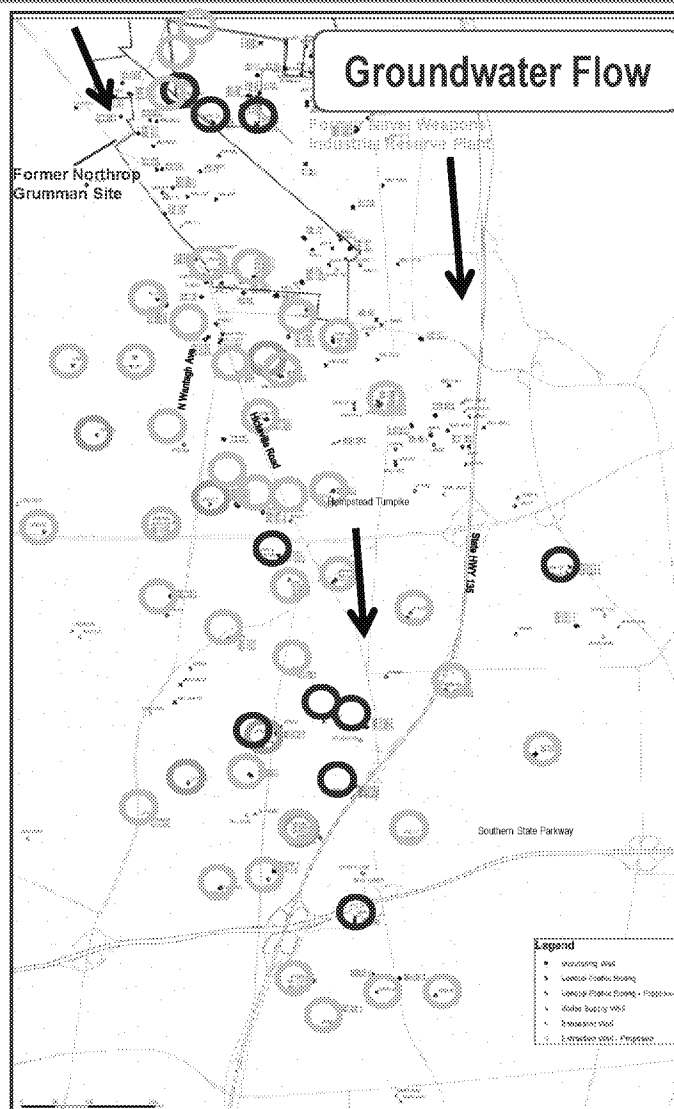
OFFSITE VERTICAL PROFILE BORINGS AND WELLS – *What has been done by the Navy?*



2009
Completed
(green)

2010 to 2012
Completed
(blue)

2012 to 2019
Completed
(orange)

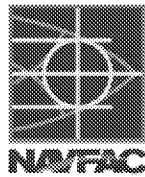


North of Hempstead
Turnpike Area

Hempstead Turnpike to
Southern State Parkway
Area

South of Southern State
Parkway Area

ON-PROPERTY VERTICAL PROFILE BORING AND MONITORING WELL INSTALLATION PROGRAM

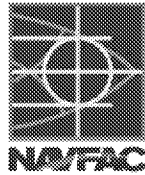


- Navy is also installing 3 vertical profile borings (VPBs) and 6 to 9 monitoring wells along western and north-western edges of property
- VPB objective is to evaluate the potential presence of deep VOC-impacted groundwater
- Monitoring wells will be used to verify VPB data, help establish facility background levels, and support the Site Inspections



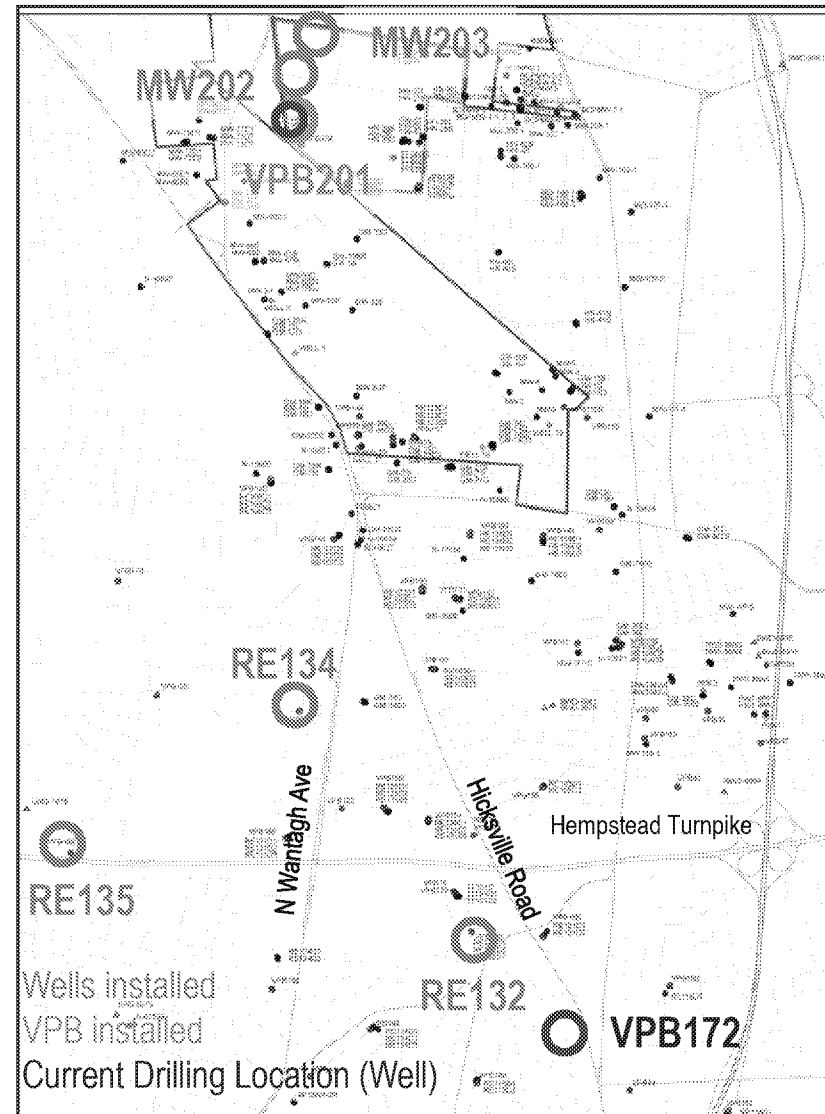
WORK PERFORMED SINCE THE LAST RAB -

VPBs and Wells



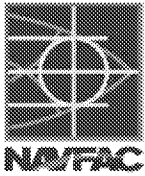
From April 2018 to present:

- Operation of 2 drilling rigs
- On-property:
 - Installation of three monitoring wells MW202S and I, and MW203S, and one vertical profile boring VPB201
 - Conducted four rounds of groundwater sampling
 - Currently installing monitoring well MW201D (VPB201)
- Off-property:
 - Installation of 13 monitoring wells associated with VPBs 132, 134, and 135 (RE132D1 to D6, RE134D1 to D4, and RE135D1 to D3 and one vertical profile boring VPB174
 - Conducted 4 rounds of groundwater sampling and water levels measurements
 - Currently drilling VPB172



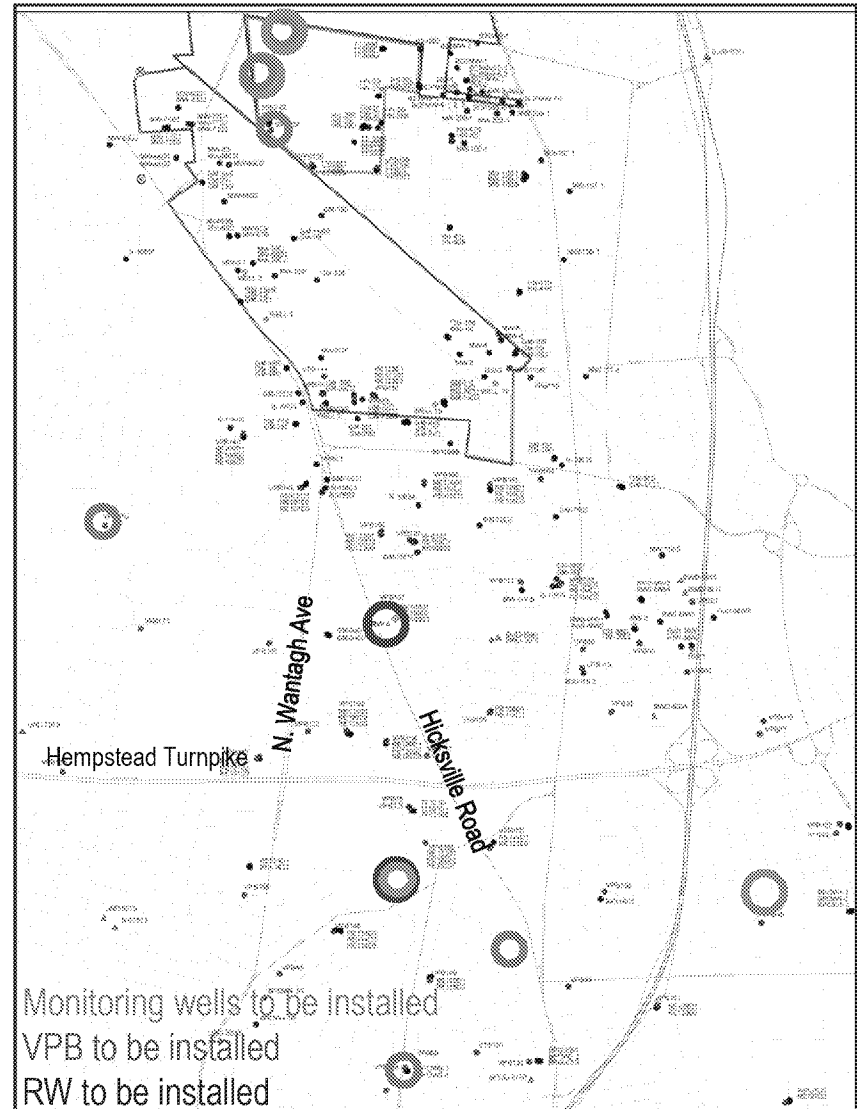
FUTURE WORK

VERTICAL PROFILE BORINGS & MONITORING WELLS



Planned work through November 2019:

- Operation of two drilling rigs
- Installation of four Vertical Profile Borings
- Installation of 11+ Monitoring Wells
- Installation of two Recovery Wells





RE108 AREA HOTSPOT TREATMENT SYSTEM UPDATE APRIL 2019 RESTORATION ADVISORY BOARD

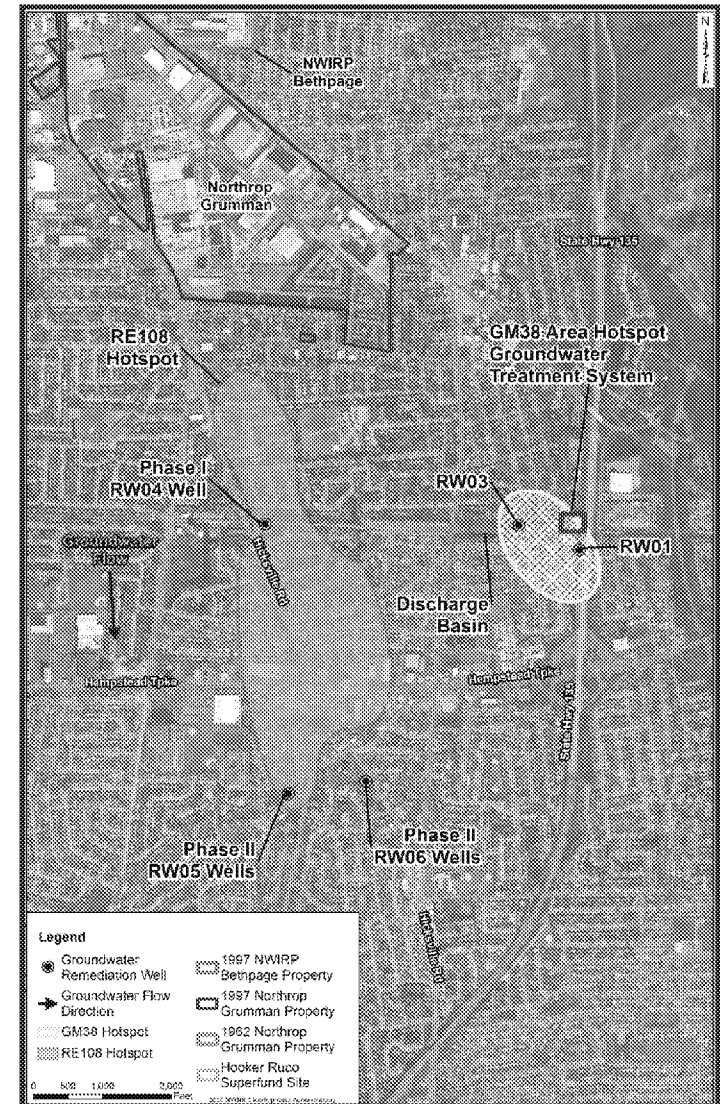
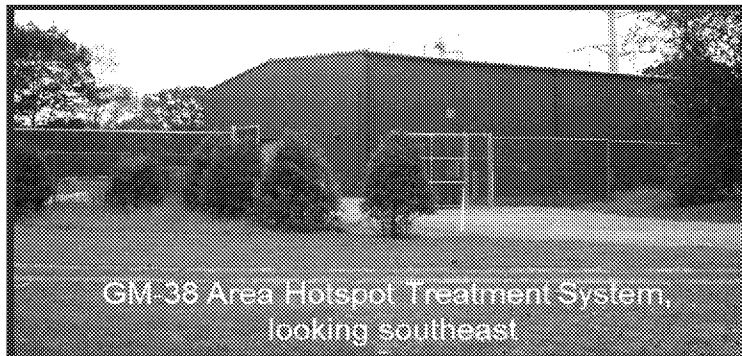
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE
LONG ISLAND, NEW YORK

04/17/2019

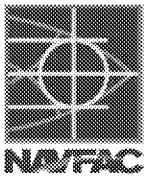
RE108 AREA HOTSPOT TREATMENT SYSTEM



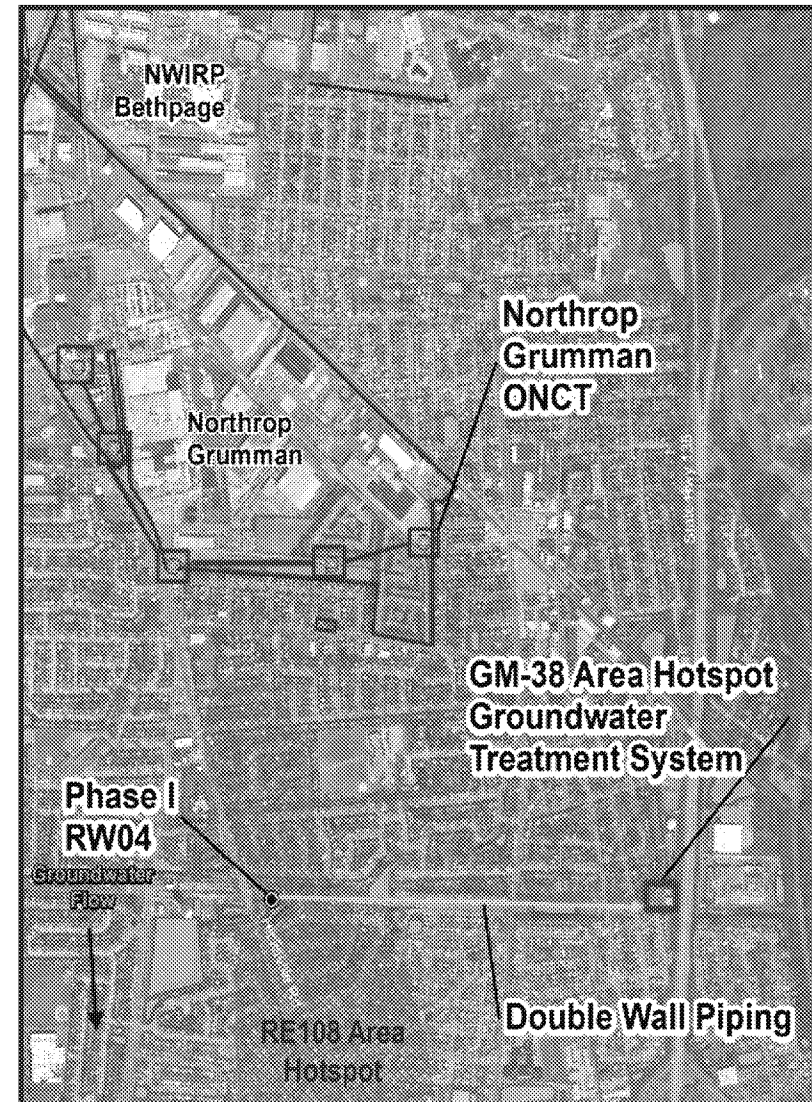
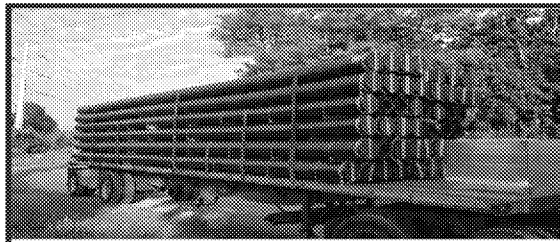
- In accordance with the Operable Unit No. 2 Record of Decision, the Navy treats groundwater that contains greater than 1 part of million (ppm) of Volatile Organic Compounds (VOCs)
- The GM38 Area Hotspot was identified in the 1990s and a treatment system started operation in 2009. It has treated over 4 billion gallons of water to drinking water standards
- The RE108 Area Hotspot is another area of VOC-impacted groundwater that contains greater than 1 ppm of VOCs
- Based on location, existing facilities, and anticipated construction schedule, the RE108 Area Hotspot was divided into two Phases



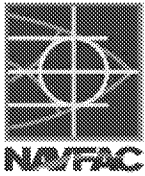
RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE I



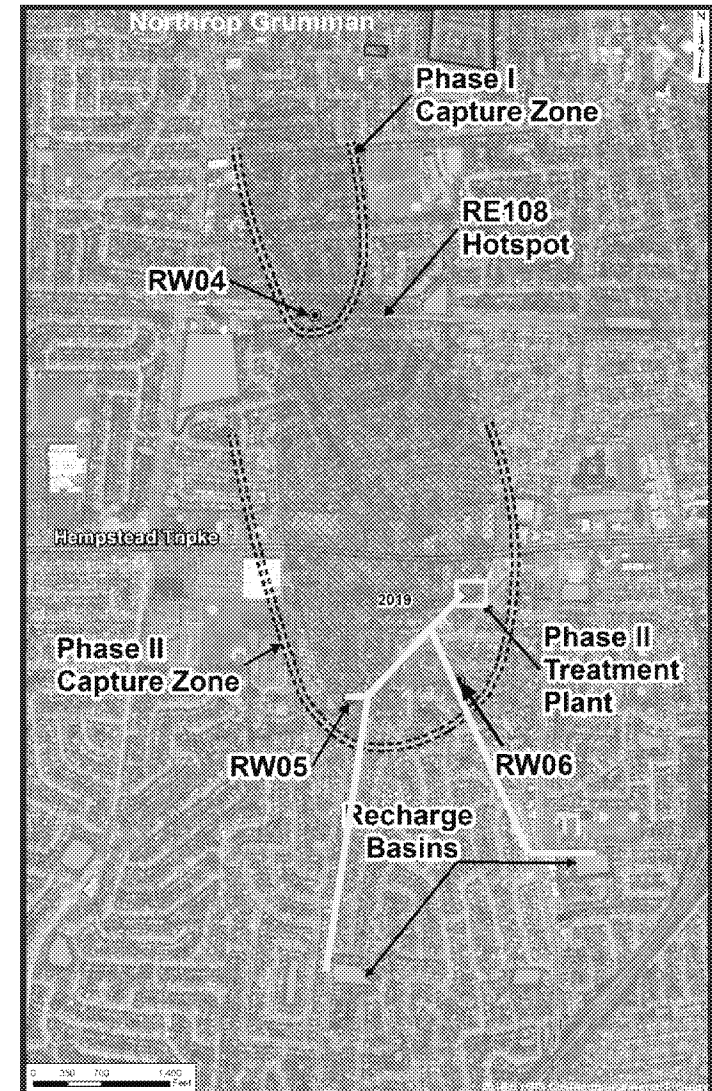
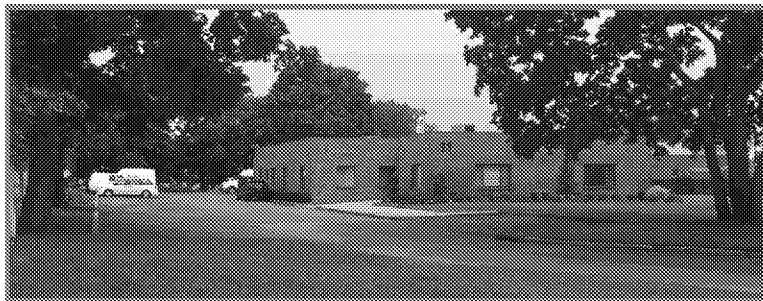
- RE108 Area Hotspot Phase I System would address the northern portion of the VOC-impacted groundwater that has moved beyond the Northrop Grumman Onsite Containment System (ONCT)
- Consists of a recovery well, piping, and the use of excess capacity at the existing GM38 Treatment System
- Construction is fully funded and the majority of piping is onsite
- Property access agreements with three separate parties is continuing
- Other non-property access activities are proceeding (GM38 Treatment System upgrades)
- Pending access, Phase I System is expected to start operation in 2019



RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II



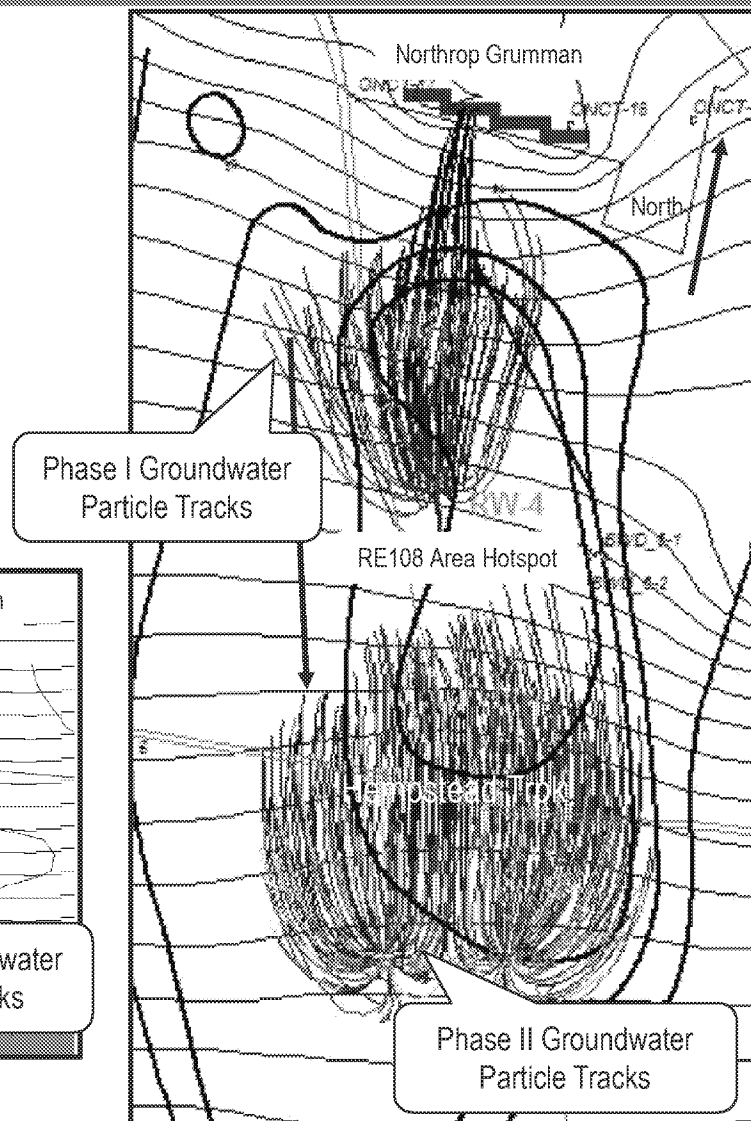
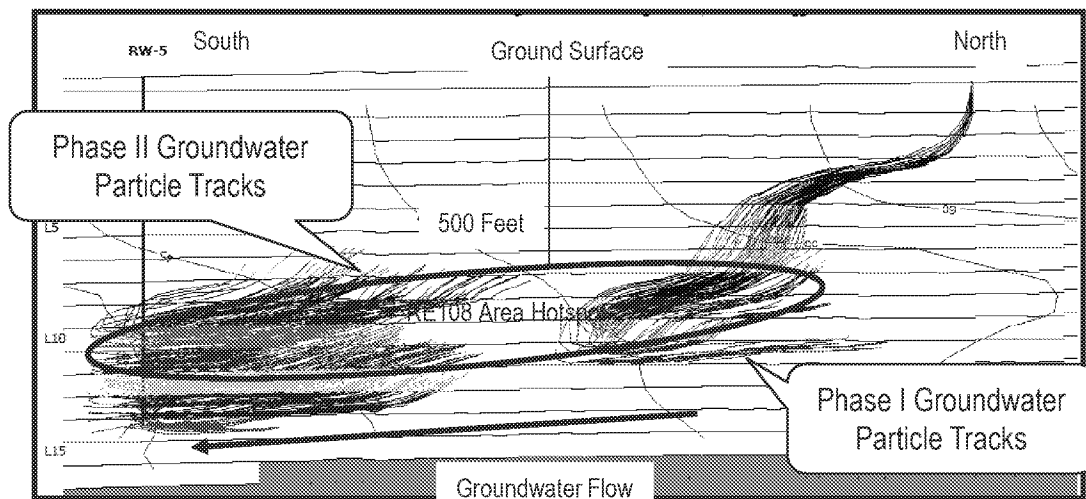
- RE108 Area Hotspot Phase II System would intercept water not captured by the Phase I System
- It would consist of:
 - Two to four new extraction wells (RW5 and RW6) near the 2023 projected extent of the RE108 Area Hotspot
 - Extraction wells would be installed in vaults, below grade
 - Navy is finalizing property access for a treatment plant, plant would be similar in size to GM38 Area Hotspot Treatment System
 - Pipe routes would follow existing roadways
 - Treated water would be re-introduced to the aquifer through recharge basins



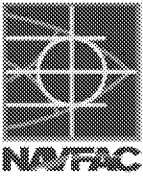
GROUNDWATER MODELING



- The Navy has developed and is using a complex groundwater model to position Phase II recovery wells and evaluate design of groundwater capture system
- Particle tracks show movement of groundwater to the new wells and extent of plume capture



RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II



- Phase II is on schedule
- Predesign testing (basin infiltration testing, geotechnical boring) and surveying are in progress
- Property access negotiations are in progress
- Building demolition design
- Treatment system will be designed to handle potential future flow rates and treatment requirements

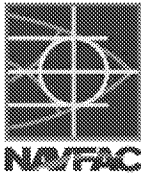
Onsite Groundwater Sampling for Preliminary Assessment/Site Inspection for Radium, PFAS, and 1,4 Dioxane

Naval Weapons Industrial Reserve Plant Bethpage

Brian Murray, NWIRP Bethpage
Remedial Project Manager

17 April 2019

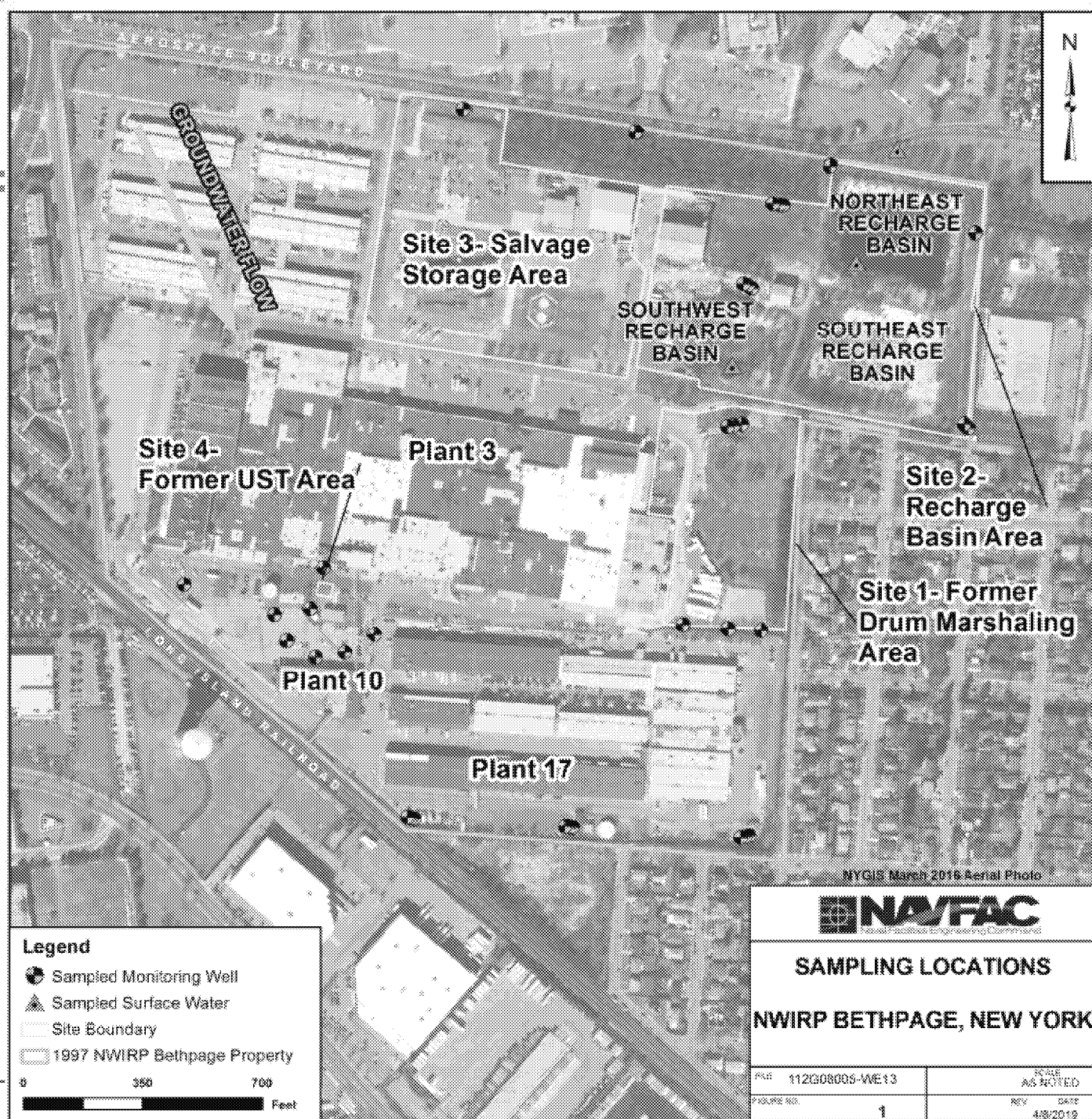
CERCLA Preliminary Assessment/Site Inspection (PA/SI)



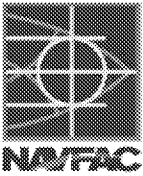
- A PA/SI is the first investigative step in the CERCLA site evaluation process when contamination is possible
- It involves desktop research of past operations, interviews, and limited site sampling
- The Navy is performing a PA/SI for radium, per- and polyfluoroalkyl substances (PFAS), and 1,4 dioxane
- A radium PA/SI is being completed due to public concerns related to the presence of this element in groundwater
- The results of the PA/SI will be provided in a draft report for NY State Dept. of Conservation (NYSDEC) review
- Sampling of groundwater monitoring wells located onsite at NWIRP is ongoing; this presentation summarizes available data

PA/SI Groundwater Sample Locations

- Existing and new onsite groundwater monitoring wells are being sampled
- A total of five separate sampling events are being performed

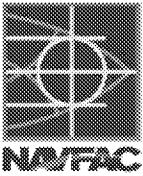


Radium



- A naturally-occurring radioactive element that is generally present at low levels in all soil, water, and rocks
- Produced from the decay of two other common, radioactive elements - uranium and thorium
- A historic use at NWIRP included radium-based luminescent dials for aircraft
- U.S. Environmental Protection Agency (EPA) has established a safe maximum level for radium in drinking water of 5 picocuries per liter (5 pCi/L). A picocurie per liter is a measurement of radiation in one liter of water.
- **For a public water supply provider to exceed this standard requires that the average value of four quarterly samples be greater than 5 pCi/L**

Radium Sampling Results in Groundwater

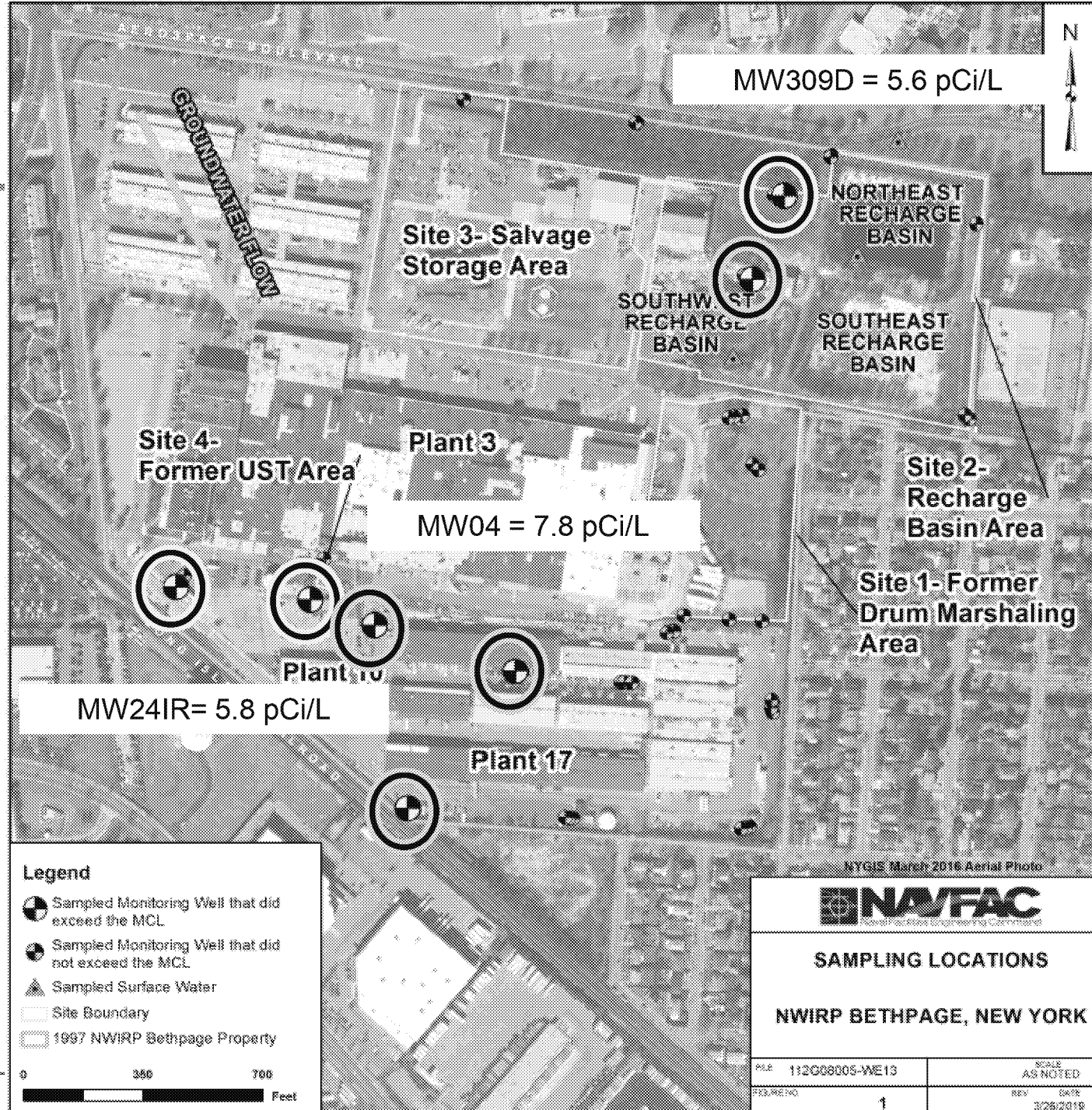


- The majority of samples (94%) were below the U.S. EPA safe maximum level of 5 pCi/L
- The overall average concentration is 2.2 pCi/L
- Ten individual samples (at seven monitoring wells) exceeded the EPA safe maximum level
- These concentrations ranged from 5.1 to 9.5 pCi/L
- The results for individual wells vary. Although individual samples at seven wells exceed the EPA safe maximum level, when the radium results from each well are averaged, only three well locations still exceed this level.
- Sample results indicate the radium is likely from a natural source, and it is unlikely that a release of radium has occurred

Wells Above 5 pCi/L

Yellow circle:
Location average
concentration
above EPA safe
maximum level

Green circle:
Location had one
sample above
EPA safe
maximum level



Per- and Polyfluoroalkyl Substances (PFAS)

- Perfluoroalkyl substances (PFAS) are a class of man-made chemicals. First introduced into commercial and consumer products in the 1940s
- PFAS have been used for many years to make products that resist heat, stains, grease, and water
- Within the Navy, PFAS are most commonly associated with aqueous film-forming foam (AFFF) used primarily for firefighting
- Most common PFAS compounds are PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate)
- **US EPA has not established a regulatory level for PFAS in drinking water**
- EPA has established drinking water lifetime health advisories (LHA) for PFOA and PFOS. EPA recommends people not use water for drinking or cooking that exceeds 70 parts per trillion (70 nanograms per liter ng/L) for PFOA and PFOS individually or the sum of PFOA and PFOS.

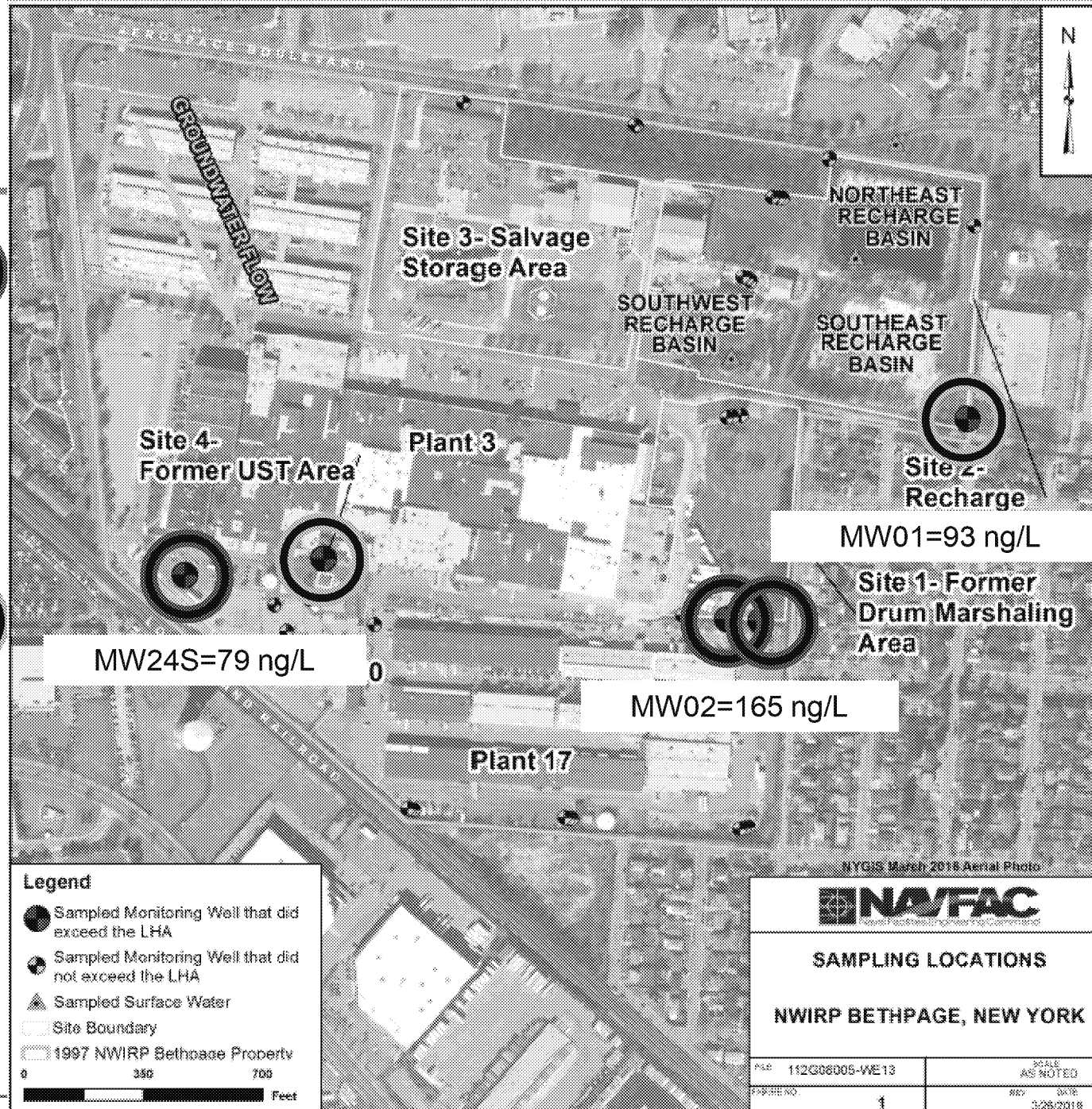
PFAS Sampling Results in Groundwater

- The sampling results from three events indicate that 94% of results are below the EPA LHA of 70 ng/L
- For PFOA, concentrations ranged from not detected to 99 ng/L – exceedances occurred in two monitoring wells
- For PFOS, concentrations ranged from not detected to 147 ng/L – both exceedances from one monitoring well
- For sum of PFOS + PFOA, three monitoring wells have a concentration above the EPA LHA

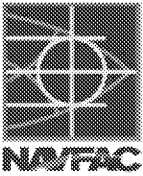
Wells Above 70 ng/L

Pink circles:
Location of
PFOS + PFOA >
70 ng/L

Orange circles:
Single PFOS or
PFOA result > 70
ng/L



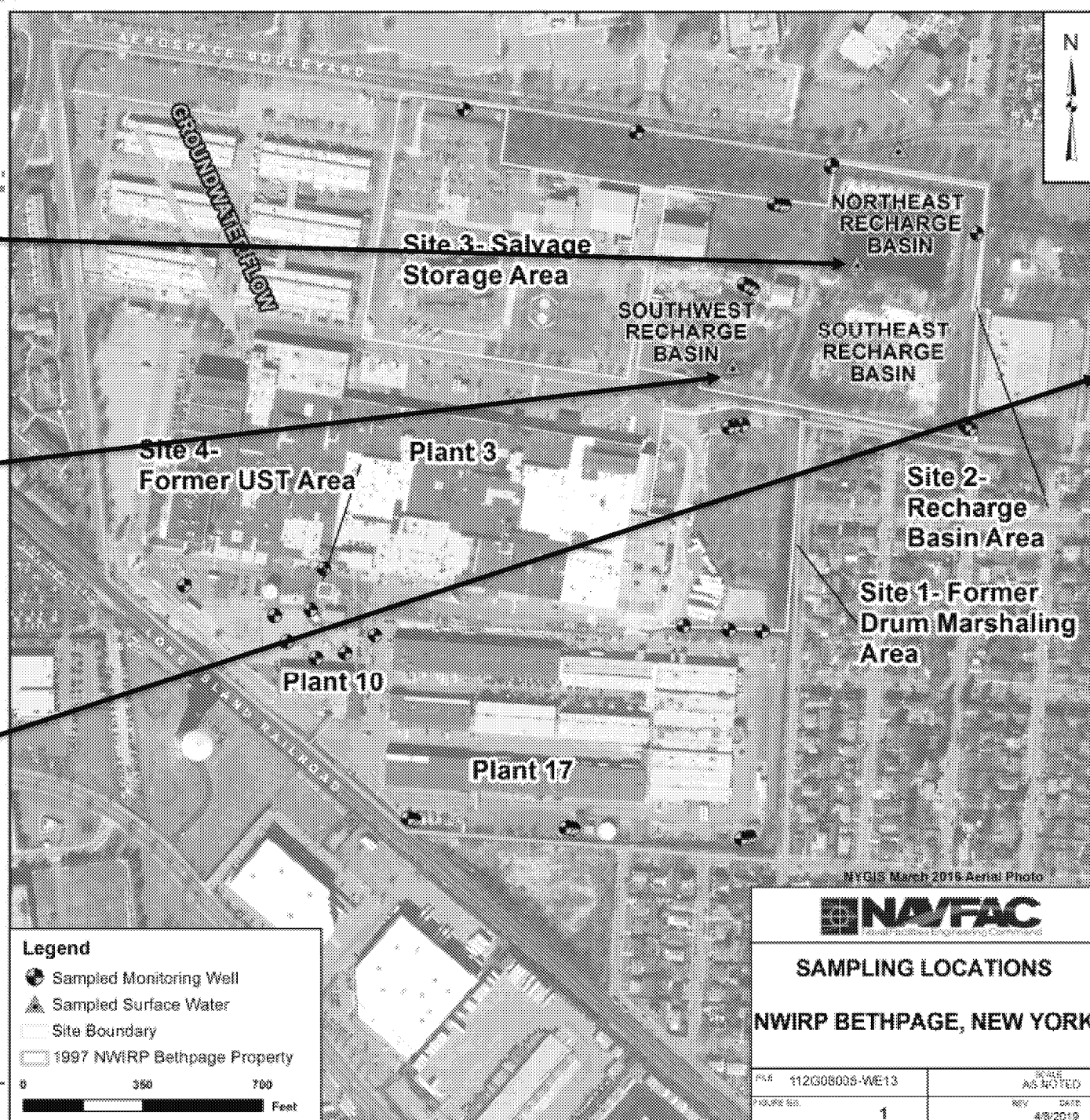
PFAS Sampling Results in Surface Water



- Surface water samples were collected from Site 2 basins along north side of former NWIRP Bethpage
- Southwest Recharge Basin receives stormwater from the majority of the former NWIRP
- Northeast Recharge Basin receives water from Bethpage Community Park Treatment System and stormwater from the former NG property to the north
- Bethpage Community Park did have a fire training area
- **The EPA has not developed a LHA or any other criteria for PFAS in surface water**

Surface Water Results

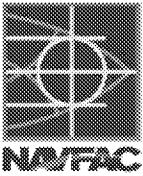
- Northeast Recharge Basin – sum of PFOA + PFOS ranged from 4.2 to 40 ng/L
- Southwest Recharge Basin - sum of PFOA + PFOS ranged from not detected to 4.5 ng/L
- Bethpage Community Park Treatment System - sum of PFOA + PFOS ranged from 28 to 36 ng/L



1,4-Dioxane

- 1,4-Dioxane is a likely contaminant at many sites contaminated with chlorinated solvents (particularly 1,1,1-trichloroethane [TCA]) because of its widespread use as a stabilizer for chlorinated solvents
- It is used in many products, including paint strippers, dyes, greases, varnishes, and waxes
- The compound is found as an impurity in antifreeze and aircraft deicing fluids and in some consumer products (deodorants, shampoos and cosmetics)
- **No federal maximum contaminant level has been established for drinking water**
- The NYS Dept. of Health Maximum Contaminant Level is 50 $\mu\text{g/L}$, however a new MCL is under review with a recommended value of 1 $\mu\text{g/L}$

1,4-Dioxane Sampling Results in Groundwater

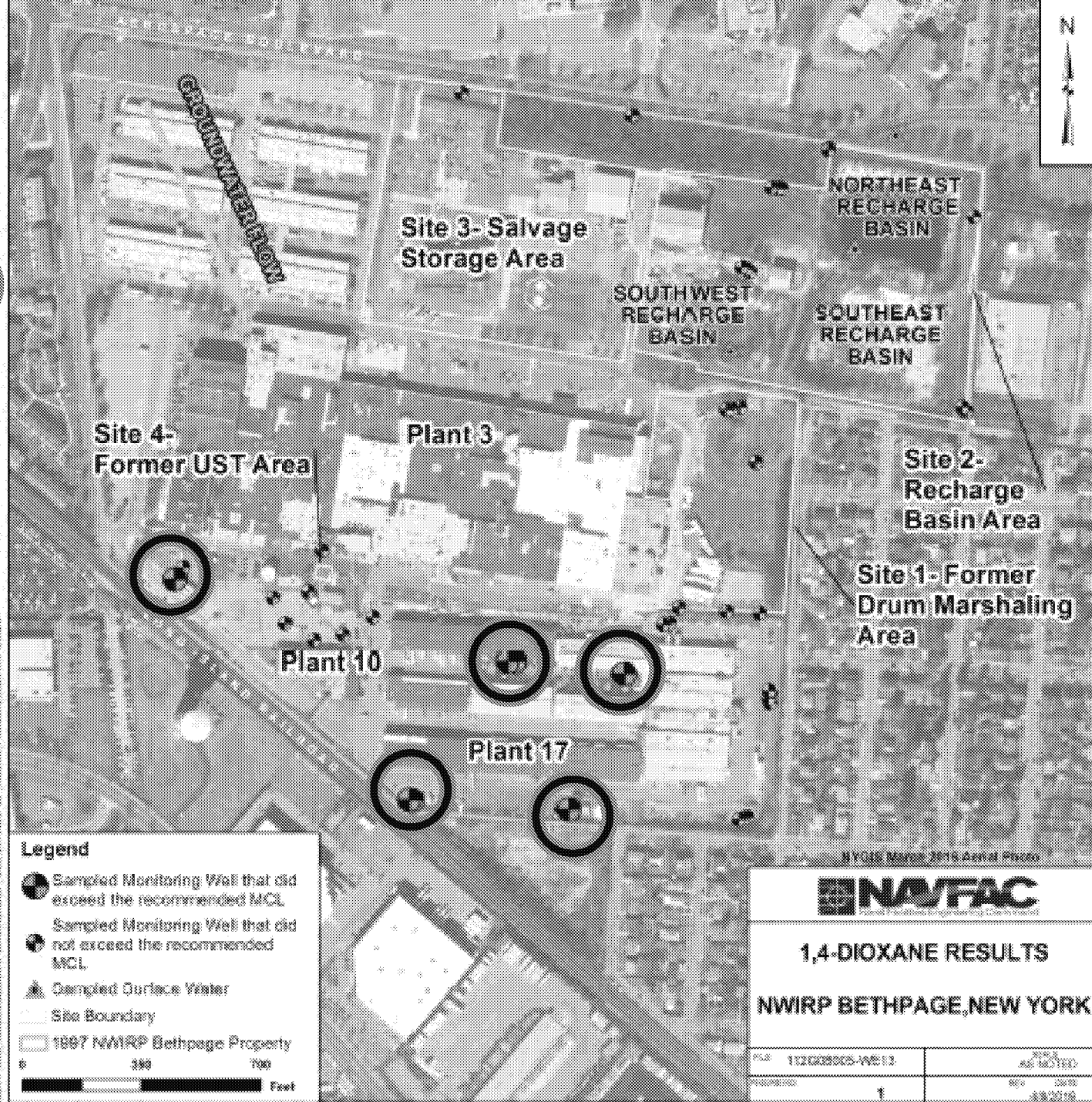


- All groundwater sample results were below the current NYSDOH MCL
- Seven well samples were above the new recommended MCL of 1 $\mu\text{g/L}$
- Concentrations ranged from not detected to 6.4 $\mu\text{g/L}$

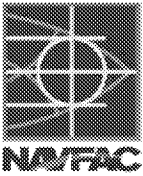
Wells Above 1
 $\mu\text{g/L}$

Orange circles:
Location of
exceedance of
recommended
MCL

Average conc. of
these results =
 $1.8 \mu\text{g/L}$



What's Next?



A fourth sampling event was completed during March 2019
(awaiting data from analytical laboratory)

Planned sampling events:

5th event – June 2019

The results of all sampling events will be compiled into a draft PA/SI report for regulatory review and will be shared with the public during RAB meetings